IN THIS ISSUE—ENGINE DESIGN, BY LOUIS COATALEN

The AUTOMOBILE

Vol. XXXVI
No. 24

NEW YORK, JUNE 14, 1917

Ten cents a copy
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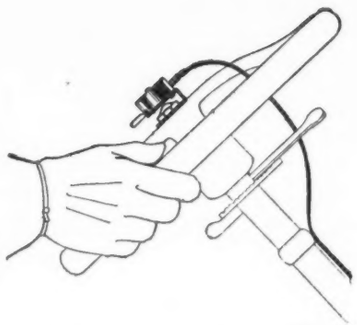
Van Sicklen

COMBINATION HEADLIGHT-DIMMER and INTENSIFIER

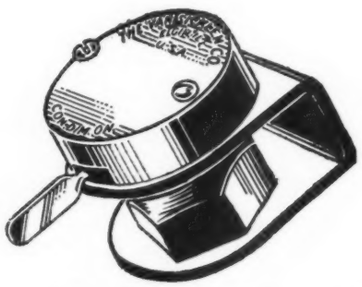
(*for* Ford Cars)



The Van Sicklen Control Switch is easily mounted on the top of the regular Ford Steering Column within thumb-reach of the Driving Hand.

Takes headlight control away from the Ford Engine and puts it within thumb-reach of the Driver's Hand.

It robs engine-controlled headlights of their greatest dangers and converts the Ford generating unit into a full-fledged, unfailing, instantly-controlled lighting system that every Ford Owner and Driver needs and wants.



A mere flip of this 3-way switch provides all required intensities of light—Normal, Dim or Intense—at all speeds of the Ford engine.

It is a Normal, a Dimmer and an Intensified Driving Light all in one at any engine speed. Installed in 10 minutes. For sale by Dealers *and* Garages nearly everywhere. *Price* $4.00

This Resistance Coil—safeguards the Ford magneto and the bulbs; and insures their life and service at all speeds.

Descriptive Booklet "Headlight Control" *mailed upon request.*
Trade Information—Prices and Discounts promptly furnished to authorized Dealers.

Made by the Makers of Van Sicklen Speedmeters

THE VAN SICKLEN COMPANY

ELGIN ILLINOIS

The Automobile

Vol. XXXVI New York—Thursday, June 14, 1917—Chicago No. 24

Marmon Ordered to France

Recently Appointed Aircraft Engineering Engineer to Study French Aviation Engines

Washington, June 11—Howard C. Marmon, of Nordyke & Marmon, Indianapolis, recently appointed aircraft engineering engineer of the Aircraft Production Board, has been ordered to France and will depart in the near future to inspect airplanes in use on the French front with a view to standardizing and co-ordinating the engines of American flyers with those in the French machines.

He will be accompanied by a large force of workmen and motor experts. It is not expected that Mr. Marmon will remain in France very long. He probably will return at about the time American manufacturers are ready to begin the manufacture of airplanes in large numbers. It is understood from reliable sources that the Government plans to place at least 17,500 flyers on the western front inside of 3 years. The present capacity for manufacturing airplanes in this country now is from 200 to 300 a year.

—

Willys-Overland to Raise Prices

Toledo, June 13—The Willys-Overland Co. is informing dealers that it will shortly announce a definite price increase. The increase is due to the advance in cost of materials and labor which is being experienced by the entire automobile industry.

—

Slade Joins Aircraft Board

Washington, June 13—A. J. Slade, consulting engineer, of New York, has been placed in charge of transportation for the Aircraft Production Board, of which Major Henry Souther is the head. Slade will probably be made a captain of transportation and be put at the head of one of the four departments under Major Souther's jurisdiction. He enters into the duties of this position immediately.

Mr. Slade has been regarded as one of the few authorities on electric commercial vehicles and electric cars generally and has been chairman of the electric vehicle division of the S. A. E. standards committee for several years. Having studied the dollars and cents aspect of road transportation very closely in connection with his consulting work, he should be eminently well fitted for his new appointment.

—

Schwab Assures Steel Supply

Detroit, June 11—The feature of the opening session of the World's Salesmanship Congress, which commenced here to-day, was an address by Charles M. Schwab, president of the Bethlehem Steel Co. Mr. Schwab said that the automobile industry need not fear a great curtailment in the supply of steel because of the continued manufacture of quantities of automobiles and trucks which is essential in conducting modern warfare.

The Government's demand for steel for ship-building and munitions will not be so great as to work any hardship on the motor car business. He said that he expected business would remain good, since the enormous expenditures now being made on the war are bound to maintain general business in a flourishing condition.

Secretary Manager D. M. Barrett reported that the congress, which was started a year ago, now embraces 16,000 members in forty-five clubs. By next year he hopes the membership will be 100,000 in more than 100 clubs.

St. Louis won the club cup. It has 3529 members and sent 151 delegates. It wants the 1918 meeting, as does Minneapolis.

At the automobile sessions this afternoon an important thought was that dealers must intensify in selling and must plan business readjustments to meet the new conditions, but that there is every reason why business should continue to be good.

Perlman Rim Suit Dismissed

Charge That Firestone Infringes Patent Withdrawn on Motion of Perlman Counsel

New York, June 12—One of the most sensational developments in the history of demountable rim patent litigation took place yesterday when the suit of the Perlman Rim Corp. against the Firestone Tire & Rubber Co., charging infringement of the Perlman demountable rim patent, was dismissed by Judge Hand without prejudice to either party. The motion for dismissal was made by counsel for the Perlman Rim Corp.

The dismissal of this suit considerably weakens the Perlman patent on demountable rim construction. If the Perlman Rim Corp. wishes to substantiate its patent for the purpose of enforcing it, further suits must be brought. The decree of the court provides that some exhibits of both Perlman and Firestone be impounded and that all testimony taken in the case just dismissed shall be available for use in any further litigation between these two parties or their representatives.

The future policy of the Perlman Rim Corp. in regard to enforcing its patent has not yet been determined.

It is understood that L. H. Perlman, president of the Perlman Rim Corp., has retired from all connection with the corporation.

Firestone was the defendant in the first suit brought under the Perlman patent, following the decision of the circuit court of appeals in February, 1916, affirming the decision of the district court of Aug. 18, 1915, which upheld the validity of the patent and declared it infringed by the Standard Welding Co. The suit against Firestone was brought in February, 1917, in the United States district court for the Southern District of New York. Nothing was brought out in the evidence affecting the validity of the patent in any way, although the Firestone interests state that they had

(*Continued on page* 1117)

New Fuel Made from Kerosene

London Chemist Patents Process for Producing Combination of Hydrogen and Oil

LONDON, June 11—William Augustus Hall, a London chemist, has invented and patented a process for making a motor fuel from kerosene that is claimed to be suitable for use in high speed internal combustion engines.

The process consists in taking the fraction of kerosene (from which the gasoline or petrol has all, or substantially all, been stripped) boiling up to about 220 deg. C., and passing this fraction, which constitutes the spirit or drying portion of the oil, between very small interstices under a very high pressure, which may be from 1000 lb. per square inch to even 3000 lb. per square inch or more, in the presence of a gas containing hydrogen or a hydrocarbon gas at a temperature not above that of the lowest boiling point of the liquid, say 100 deg. to 120 deg. C.

By this means there results a combination of the gas and the liquid hydrocarbon, causing a certain amount of hydrogenation of the latter, the result being a considerable lowering of the flash point of the liquid hydrocarbon and an alteration of the odor.

Description of Apparatus

Apparatus for producing this combination of the gas and oil may consist of a form of homogenizer of the kind used in homogenizing milk, consisting of a series of metal disks or plugs between or through which the liquid is forced in the presence of the gas. The metal disks or plugs are preferably made of nickel and may be very finely grooved, i.e., may be provided with mere scratch marks. The gas employed may be hydrogen, or any coal gas containing hydrogen, or hydrocarbon gas such as oil gas or acetylene.

The product obtained is distinguished by its much lower flash point than the fraction of kerosene having this boiling range, as also by the loss of the kerosene odor and the production of a new odor and a liveliness of the fuel not possessed by kerosene when used in a high-speed internal combustion engine.

It would appear that by this process the inventor is able to cause one volume of liquid to take up more than one volume of gas.

Claims of Inventor

The claims of the inventor are summed up as follows:

1.—Process of producing from kerosene or paraffin oil fuel suitable for use in high-speed internal combustion engines consisting in passing the fraction boiling up to about 220 deg. C. under a high pressure through narrow interstices in the presence of a gas containing hydrogen or a hydrocarbon gas, at a temperature not above the lowest boiling point of the liquid.

2.—Process of producing from kerosene or paraffin oil fuel suitable for use in high-speed internal combustion engines consisting in passing the fraction boiling up to about 220 deg. C. under a high pressure through narrow interstices in the presence of a gas containing hydrogen or a hydrocarbon gas at a temperature not above 100 deg. C. to 120 deg. C.

3.—Process of producing from kerosene or paraffin oil fuel suitable for use in high-speed internal combustion engines consisting in passing the fraction boiling up to about 220 deg. C. under a high pressure through grooves in metal discs in the presence of a gas containing hydrogen or a hydrocarbon gas at a temperature not above that of the lowest boiling point of the liquid, substantially as and for the purpose set forth.

—

New Buick Six at $1,385

FLINT, MICH., June 13—The Buick Motor Co. has brought out a new six-cylinder, seven-passenger car carrying a three-point suspended block engine of 3⅜ by 4½ in. bore and stroke in a 124-in. wheelbase chassis, and selling for $1,385. It has left drive and center control. The engine is said to develop 60 brake horsepower and has light pistons and connecting rods. Valves are large and mounted in readily accessible cages in accordance with the Buick overhead valve construction. Oiling is by circulating splash and cooling, which is by pump, is thermostatically controlled, and the electric system is a Delco single-unit type.

The clutch is a special multiple disk dry plate and gearset is three-speed selective. The rear axle is a Weston-Mott floating design carrying the entire load on the housing, with the differential mounted on large Timken roller bearings. Drive is by inclosed shaft with a single self-oiling universal to spiral bevel gears. Service brakes are internal contracting. Timken roller bearings are used in the front wheels. Rims are demountable and tires are 34 by 4½ straight side.

Rear springs are the special Buick floating cantilever type, with semi-elliptics in front, aided by shock absorbers.

Equipment includes: One-man type top, rain-vision windshield, speedometer, clock, horn, lamps, etc.

—

To Continue Pullman Cars

YORK, PA., June 9—The Pullman Motor Car Corp. will continue manufacturing Pullman cars under a contract between the receivers, W. A. Keyworth, C. L. Hoff and Henry Schmidt, and the National Products Co., Newark, N. J. A petition for authority to sell the plant and assets of the Pullman company to the National Products concern has been presented by the receivers to Judge Whitmer, of the United States District Court, Sunbury, Pa. Purchase of the Pullman company will be approved by the court on June 15 providing no objections are entered by creditors in the meantime. It is stated that the entire organization of the receivers of the Pullman company will be maintained by the National Products Co.

—

Ford Demonstrator Trucks in Month

DETROIT, June 14—The Ford Motor Co. will ship demonstrators of its new truck to dealers throughout the country within the next 30 days.

Billion for Aircraft Department

Government May Spend $1,000,000,000 To Fight War in Air

The United States will spend $1,000,000,000 in the purchase of airplanes that the war may literally be fought from the air. In harmony with a movement of this character, the Senate Committee on Military Affairs has appointed a subcommittee to begin hearings on a bill of Senator Morris Sheppard, of Texas, to establish a Department of Aeronautics.

The decision of the committee to begin hearings on this measure is taken to mean that a strong administration sentiment in favor of this radical departure exists. Senator Sheppard's bill provides an appropriation of $1,000,000,000 for carrying its provisions into effect. Should the bill become law, a secretary of aeronautics would be appointed, who would be a member of the President's cabinet.

—

DuPont Erects Aviation School

CLAYMONT, DEL., June 14—The duPont de Nemours Co. is erecting a large aviation school here. Two hangars have been completed and three more are under construction. Curtiss and Thomas tractor-type airplanes and Thomas flying boats are used.

—

Emerson Company to Continue

NEW YORK, June 12—The Emerson Motors Co., Kingston, N. Y., is not to be reorganized. The receivership in which the company was placed last week was terminated at the end of 48 hours, following an agreement between stockholders and creditors, because, according to Bainbridge Colby, attorney for the company, the company is at present solvent. President Theodore A. Campbell states that there is no truth in newspaper stories to the effect that the company is to be reorganized and its capital reduced from $10,000,000 to its assets, which are said to be about $100,000. At present Campbell is at the plant and has commenced operations. There are at present about 90 cars assembled on the floors ready for shipment, and these are being sent out to dealers.

—

Ross Company To Reorganize

DETROIT, June 13—Plans are being perfected for the reorganization of the Ross Automobile Co. John L. Ross will take an extended vacation. H. D. Mackaye is now general manager. The company will adopt a new policy, doing no manufacturing and discontinuing models K-25 and A and will assemble only model C, the Ross eight. New officials of the company will be announced in the near future.

The Ross company has $75,000 worth of new parts and a power plant, comprising a Brucer Bitt 100-hp. gas engine with a generator worth $45,000 and some other parts and materials, to sell.

April Exports Value Decrease

Decline from $11,657,624 in 1916 to $9,740,989—More Cars, Fewer Trucks

Mos.	Cars	Value	Trucks	Value	Parts
1917					
April	7,276	$5,166,640	1,039	$2,416,368	$2,157,981
Mar.	5,755	4,025,389	1,040	2,961,389	3,044,195
1916					
April	6,242	4,998,350	1,790	5,259,480	1,399,794

WASHINGTON, June 11—Exports of automobiles and motor trucks during April and the preceding 9 months show an increase in the number of vehicles shipped abroad but a decline in the total value. This is due to the larger number of automobiles exported and the smaller shipments of trucks. In April 7276 automobiles were sent to foreign countries as compared with 6242 in April of 1916. There were only 1039 motor trucks exported, however, as compared with 1790 in April of last year. It is worthy of notice that the value of parts, excluding engines and tires, jumped from $1,399,794 in April a year ago to $2,157,981 this year.

During the 9 months ending April, 1917, American automobile manufacturers exported 50,476 passenger cars and the motor truck industry of the country shipped 12,976 trucks abroad. In April, 1916, the automobiles exported numbered 45,048 and the motor trucks 18,135. Total values for the period in 1916 amounted to $101,390,939, as compared with $95,355,942.

Shipments to South American countries show a healthy increase, Argentina being the only one to show a falling off, this being due to bad crops and unfavorable economic developments. Shipments to Asiatic countries jumped from 181 in April, 1916, to 762 this year, showing that our manufacturers are securing a firm foothold in that part of the globe.

Canada continues our largest customer, taking 2937 cars and trucks in April this year, as compared with 2130 last year. Shipments to belligerent countries of Europe were made up practically entirely of trucks for war work.

Tire Makers Meet Army Specifications

NEW YORK, June 14—The United States Tire & Rubber Co. is making demountable type tires such as are called for in the Government specifications for army use, and can make immediate deliveries. The Kelly-Springfield, Firestone and Goodyear companies are also preparing to make this type in commercial quantities.

Tipper Talks to Advertising Clubs

ST. LOUIS, MO., June 11—Automobile interests formed a considerable part in the 13th annual convention of the Associated Advertising Clubs of the World here last week.

Harry Tipper, manager of THE AUTOMOBILE, was one of the speakers at the meeting of the Business Press Section.

Among the speakers were: Guy L. Sullivan, advertising manager, Fisk Rubber Co.; Samuel P. Colt, president U. S. Rubber Co.; John N. Willys, president Willys-Overland Co.; R. D. Chapin, president Hudson Motor Car Co.; E. S. Babcox, advertising manager Firestone Tire & Rubber Co., and W. O. Rutherford, sales manager for the B. F. Goodrich Co.

Napoleon Plans New Four

TRAVERSE CITY, MICH., June 11—The Napoleon Motor Car Co., which is moving to this city, will manufacture a new model which has a 30 hp., four-cylinder, block 3¼ by 5-in. Lycoming engine. The equipment of the car includes a dry disk clutch, Stewart vacuum feed, Zenith carbureter, Connecticut ignition, semi-floating Weston-Mott rear axle, Hyatt roller bearings, and 31 by 4 tires. Wheelbase is 112 in.; weight 2200 lb.

DETROIT, June 11—The Motors Metal Mfg. Co. has increased its capital stock from $100,000 to $200,000.

Aircraft Expert To Address S. A. E.

Lieut. de La Grange, of French Aviation Corps, Speaks June 26—Airplanes Important

NEW YORK, June 11—Additional interest is given the Washington meeting of the Society of Automotive Engineers, Monday and Tuesday, June 25 and 26, by securing Lieutenant Amaury de La Grange, of the French Aviation Corps, to present a paper on war airplanes, their different kinds and duties, for the afternoon of Tuesday, June 26. Lieutenant de La Grange has been sent to this country by the French government to assist in developing airplanes, etc.

Aircraft Will Win War—Coffin

WASHINGTON, June 13—Howard Coffin, chairman of the Aircraft Production Corp. of the Council of National Defense, officially announced to-day that the Government's aircraft program has been greatly enlarged and definite plans made which will give America and her allies a permanent supremacy in the air. Miltions, the Allies in aggregate resources. construction of machines and training of men. In his statement Mr. Coffin said: "In the present struggle between Germany and the Allies the fight for supremacy in the air is practically even. It is a nip-and-tuck race in both manufacturing and fighting. Germany has the supremacy in manufacturing organizations, the Allies in aggregate resources. There is reason to believe that neither alone can secure a definite and permanent supremacy. This is America's one chance for turning the scale within a year."

303 Reservations for S. A. E. Dinner

NEW YORK, June 12—Reservations for the S. A. E. dinner to be held at the New Willard Hotel in Washington June 26 have already reached a total of 303.

Exports of Automobiles, Trucks and Parts for April and 9 Previous Months

	April				Nine Previous Months			
	1916		1917		1916		1917	
	No.	Value	No.	Value	No.	Value	No.	Value
Passenger cars	6,242	$4,998,350	7,276	$5,166,640	45,048	$34,269,158	50,476	$37,395,743
Commercial cars	1,790	5,259,480	1,039	2,416,368	18,135	48,898,380	12,976	36,157,941
Parts, not including engines and tires	...	1,399,794	...	2,157,981	....	18,223,401	...	21,802,258
Total	8,032	$11,657,624	8,315	$9,740,989	63,183	$101,390,939	63,452	$95,355,942
By Countries								
Denmark	73	$55,452	86	$89,043	597	$411,708	1,243	$974,069
France	1,056	3,086,601	248	438,375	6,203	16,290,264	4,709	13,516,619
Germany	...	.....	...	.....	....	.....	...	.....
Italy	4	3,073	1	2,500	256	172,731	78	50,930
Russia in Europe	178	433,825	2	3,758	4,774	14,868,354	2,354	6,035,986
United Kingdom	713	870,184	462	1,428,241	16,820	22,959,602	5,479	14,024,596
Other Europe	395	922,988	203	229,212	1,745	2,259,142	3,775	3,060,193
Canada	2,130	1,371,108	2,937	2,025,797	7,433	5,156,373	10,551	8,007,214
Mexico	47	43,897	360	185,127	338	328,318	1,497	919,115
West Indies and Bermuda	497	272,099	247	252,383	3,860	2,345,668	4,441	3,463,488
Argentina	505	245,984	369	260,283	3,497	1,630,943	3,448	2,055,613
Brazil	20	12,318	65	45,725	204	127,247	623	364,475
Chile	125	63,814	264	217,000	704	464,555	1,976	1,425,326
Venezuela	47	24,718	13	13,913	416	264,470	503	320,672
Other South America	40	21,419	242	132,887	453	256,288	1,621	976,700
British East Indies	341	268,987	330	304,400	2,467	1,875,183	4,431	3,333,473
Australia	1,319	948,367	507	413,801	6,109	5,000,813	4,435	3,323,789
Asia and other Oceania	181	280,498	762	695,963	4,178	5,461,385	7,881	8,587,697
Other countries	361	1,332,498	1,217	844,600	3,129	3,294,494	4,407	3,113,729
	8,032	$10,257,830	8,315	$7,583,008	63,183	$83,167,538	63,452	$73,553,684

Quick Response to Call for Army Vehicles

Automobile and Truck Manufacturers Submit Bids—Most Makers Cut Prices Nearly 25%

CHICAGO, June 11—Automobile and truck manufacturers responded nobly to the call of Uncle Sam for military vehicles as evidenced by the bids which were opened Friday, yesterday and today by Colonel Kniskern, of the Central Department, Quartermaster Corps. Bids for the entire vehicle equipment of the United States Army, for which the Government called on all manufacturers 3 weeks ago, were submitted to the Chicago depot of the quartermaster's department in response to the war department's advertisement. Fifty-nine automobile makers offered bids on two and five-passenger cars, bids ranging all the way from $420 for the Saxon up to $3,500 for the Locomobile. Most of the manufacturers cut their prices approximately 25 per cent to the Government.

It was in the opening of the offerings of the 1½-ton and 3-ton trucks that the most interest was shown because these bids were called for originally on the army's standard specifications, which were drawn up with the assistance of the standards committee of the Society of Automotive Engineers. The standard specifications depart to such an extent from the specifications of the manufacturers for trucks built for commercial use, that few, if any, manufacturers could promise early delivery on the type A and type B units, as the 1½-ton and 3-ton Government specifications trucks are classified. Consequently word was sent out from the quartermaster's department that bids would be received on immediate or early delivery on trucks in quantities according to the manufacturers' own specifications. There were eighty-three bids on trucks. These covered the two capacities mentioned and were submitted by eighty-one different manufacturers, most of them bidding on their own specifications, but many of them setting a figure at which they could manufacture according to Government specifications within from 2 to 4 months.

On the light delivery truck of 1½, ¾ and 1-ton capacity, the bidding was not so heavy. There were twenty-three manufacturers who offered to build the lighter vehicles, and, in addition, there were four makers of truck-forming attachments who offered to submit either the attachments alone or Ford or Dodge cars formed into trucks, in varying quantities and from immediate delivery up to 3 months.

Manufacturers as a whole cut their prices considerably in the Government bids, both on account of patriotic reasons and because quantity orders were anticipated. Anticipation of increasing prices affected many of the offers. Packard, for instance, set the date of Aug. 10 as the time after which it would have to accept contracts at a considerable increase. Other concerns made a price on deliveries up to Jan. 1 approximately 10 per cent lower than deliveries after that date. Other manufacturers put in a clause stating that their price was based on current material and part costs and would have to be increased in proportion as the costs increased. This averaged 10 per cent.

Many manufacturers took it into consideration by offering to build a truck to Government specifications at a flat rate of cost plus a percentage. Willys-Overland offered to manufacture at a cost plus 15 per cent, and most of the others made their figures cost plus 10 per cent.

Some concerns offered to turn over their plant wholly or in major proportion to the Government for truck manufacture. The J. C. Wilson Co., for instance, offered to turn over 75 per cent of its capacity for Government productions, at cost plus 10 per cent basis, and stated that it could turn out 6400 per year. The Denby Motor Truck Co. placed its entire production of 200 per month at the disposal of the Government on 4 months' notice.

The Four-Wheel-Drive Co., Clintonville, Wis., offered to license other manufacturers to use its four-drive patent on Government work.

Some unusual requests were brought to light in the matter of suggestions for Government control of supplies, as, for instance, that of Charles E. Reiss & Co., who made a proviso of their contract that the Government guarantee delivery of parts. Some of the big offers included those of Velie, who bid on any number up to 5000; General Motors, 1000; Nash, 5000 and 500 per month after the first year; Stegeman, 2000; J. C. Wilson, 4800; Willys-Overland, 10,000, at the rate of 500 per month on the big trucks and fifteen per day on the small ones, and Studebaker is prepared to furnish 1200.

The lighter trucks were offered both with bodies and without, but there was a special call for Government specification bodies for type A and type B trucks, and there were nearly 100 body manufacturers who made bids on service bodies with or without their canvas covers at from $200 to $350. These were offered in large lots, such as that of the J. G. Brill Co., which offered to furnish 21,000 in the first year.

Plans of the war department, so far as the awarding of contracts is concerned, are not announced as yet; in fact, at the Central Depot here, the instructions regarding the bids, according to Lieut. Ecker, are to make a digest of the bids and forward them to Washington for disposal at headquarters. Whether the contracts will be forwarded from Washington or Chicago is not known.

Bids for Supplying Government With Cars and Trucks

AUTOMOBILES

FOURS

Name	Rate of Delivery	Model	Net Price
Reo	15 per day	Roadster	$825.00
Reo		S	825.00
Empire	8 per day	50	810.00
Empire		51	873.75
Interstate	1 per day	5-Passenger	753.00
Interstate	1 per day	Roadster	715.00
Monroe	250 per month	M-"4"	850.00
Monroe		M-"3"	450.00
Overland	100 per day	85-B-"4"	760.65
Overland	10 per day	85-B-"4" Roadster	748.00
Willys Knight	10 per day	88-"4"	1185.75
Willys-Knight	25 per day	89-"4"	1175.00
Scripps-Booth	100 per week	"4"	794.95
Dodge	100 per day	5-Passenger Touring	735.00
Dodge	100 per day	2-Passenger Roadster	735.00
Buick		E-"35"	795.00
Crow-Elkhart	150 per month	CE-"35"	760.50
Studebaker	625 per month	4 Touring	738.75
Studebaker	325 per month	4 Roadster	738.75
Moline	100 per month	"4"	1270.00
Briscoe		"4"	725.00
F. F. Stearns	50 per month	"4"	1260.00
Saxon	40 per day	2-Passenger	420.25
Harroun	25 per day	Military Roadster	$752.00
Harroun	25 per day	Touring	667.25
		After Nov. 1 Mil. Roadster	852.00
		Touring Roadster	767.35
Monitor	15 per day	5-Passenger	895.00

SIXES

Name	Rate of Delivery	Model	Net Price
Monitor	15 per week	5-Passenger	1095.00
Marmon	100 in 40 days	6	2480.00
Westcott	100 per month	6 Touring	1432.00
Reo		6-M	1200.00
Reo		6-N	1200.00
Moon	20 per week	6	1500.00
Velie	5 per day	6-27	1227.50
Jordan	25 per week	6	1400.00
		After Sept. 1	1475.00
Empire	8 per day	70-A	925.00
Kissel	20 per day	6 Touring	1050.00
Kissel	20 per day	6 Roadster	1050.00
Franklin	50 per week	6	1560.00
General Motors	250 per month	Oakland 6	850.00
National	50 per month	A-6	1618.75
Glide	50 per month	6-40	1000.00
Lexington	25 per day		1285.00

Name	Rate of Delivery	Model	Net Price
Grant	25 per month	K-6	$657.00
	After Aug. 1	G-6	755.00
Marion-Handley	100 per month	5-Passenger	1140.00
Marion-Handley		5-Passenger	1650.00
Mitchell	50 per day	B-540	875.00
Chandler	25 per month	6	1295.00
Haynes (5-Passenger)	100 per month	6	1355.75
Haynes	100 per month	6	1466.25
Anderson	100 per month	6	906.50
Chalmers	10 per day	5 Touring	.....
Chalmers	10 per day	Roadster	.....
Chalmers	10 per day	7-Passenger	1095.00
Columbia	30 a day	6	1180.00
Buick		E-49	1495.00
Mitchell	50 per day	B-40	875.00
Mitchell	50 per day	C-42	1094.00
Patterson	3 per day		.....
Elgin	125 per month	5-Passenger	837.25
Studebaker	1000 per month	Touring	937.50
Studebaker	300 per month	Roadster	937.50
Davis		"6" H	961.25
Davis		"6" I	961.25
Davis		"6" J	961.25
Apperson	5 per day	"6"	1432.00
McFarland	4 per month	"6"	2450.00
Singer	12 per month	5-Passenger	2575.00
Locomobile	100 per month	"6"	4500.00
	EIGHT AND TWELVE		
Lewis	5 per day	"8"	988.00
Knight	5 per day	88-"8"	$1657.50
King	10 per day	"8" 7-Passenger	1250.00
King	10 per day	"8" 3-Passenger	1250.00
	After Oct. 15, cost plus 10%		
Cadillac	20 per day	"8"	2097.50
Cole	200 per month	"8"	1525.00
	After Jan. 1		1695.00
Stearns		"8"	1880.00
National		AK "12"	1968.75
Packard	100 per month	"12"	2592.00
	MISCELLANEOUS		
Nash	50 per day		1172.00
Cortland	50-75 by Nov		775.00
Nabob	25 per week		795.00
Overland	50 per day	90-Roadster	578.00
Anderson	25 per week		1000.00
Paige	10 per day	Fairfield	1000.00
Paige	10 per day	Stratford	1106.60
Paige	10 per day	Linwood	869.50
Paige	10 per day	Dartmoore	869.50
	After Dec. 1 cost plus 10%		
Seneca	4 per day		691.00
E. A. Nielson	1 per day	5-Passenger Touring	1100.00
E. A. Nielson		2-Passenger Roadster	950.00
Hoosier	75 per month		908.00
Hudson		7-Passenger	1278.75
Hudson		101-1000	1254.00
Jackson	10 per day		1000.00
	After Sept. 1		

MOTOR TRUCKS

	DELIVERIES			PRICE			
	After Order	Per Mo.	Total	1½-Ton	A Body	3-Ton	B Body
Dayton	3 days	12	350	.....	.....	$4000	Extra
Bowling Green	.....	.....	2000	$2785	.....	.....	.....
Moreland	.....	200	550	2250†	.....	2880†	.....
Corbitt	.....	10	.....	2500†	$200	.....	.....
Selden	30 days	100	1500	2807	.....	3716	.....
Master	5 days	100	.....	2390‡	.....	.....	.....
Burford	Immed.	100	2300	2463†	.....	3813†	.....
Oneida	July 10	5	45	1855	.....	2520	.....
White	July 1	200	5725	3150†	.....	3800†	.....
Signal	August	.....	.....	2300†	.....	3000	.....
Bourne Magnetic	August	25	450	2750†	.....	.....	.....
Schacht	August 15	25	.....	2650†	.....	3200	.....
Tower		25	.....	1640	.....	.....	.....
Dort	30 days	100	.....	2975†	.....	.....	.....
Kelly-Springfield	January 1	280	.....	2600†	.....	3442†	.....
Kelly-Springfield	January 1	280	.....	3090*	.....	3590§	.....
Norwalk	.....	.....	.....	.....	.....	2860	.....
Grove	October 1	.....	.....	1786†	.....	.....	.....
Pierce-Arrow	September	100-300	800	3500†	.....	4300†	.....
Pierce-Arrow	January 1	250	.....	3800*	.....	.....	.....
B. & M		100	3000	3100* (With body)			.....
Staver	.....	.....	.....	.....	.....	3950§	.....
Winther	August 5	.....	2500	2325†	.....	.....	.....
				2850*			
Gramm-Bernstein	July	66	759	2790*	.....	3100§	.....
Federal	.....	.....	.....	1966†	305	2563†	336
Velie	30 days	100	5000	2700†	205	3750†	255
Fageol	.....	.....	100	3500*	.....	4500§	.....
Republic	August 10	.....	3300	2020‡	.....	2575‡	.....
Garford	July	100	1050	2730	255	3537	288
Brockway	.....	.....	1492	2975*	255	3872§	295
Wilcox	September 29	75	.....	2200†	.....	.....	.....
Wichita Falls		5	100	2950*	.....	3800§	.....
Kissel	4 months	150	.....	2627*	.....	.....	.....
		75	.....	2100†			
Atchison		50	750	2400†	.....	2900†	.....
Moon		50	500	2550*	285	.....	.....
General	Immed.	.....	1000	2390†	.....	3140†	.....
Dorris	Oct. 10	10	750	2443†	.....	.....	.....
Sandow	Sept. 1	20	300	.....	.....	2983	.....
Reo	30 days	75	.....	1485*	144	.....	.....
Pullmore		25	300	.....	.....	3000	.....
Consolidated	July	.....	585	2155†	375	.....	.....
			600	2250*			
Bessemer		225	.....	2325†	.....	3313§	.....
				2413*			
Lippard-Stewart		70	.....	3237	250	.....	.....
				3300*			
Stewart	July	100	600	1785†	.....	.....	.....
Forschler	July	5	.....	2055	.....	.....	.....
Hewitt-Ludlow		4	.....	2850†	.....	3950†	.....
Standard		125	.....	Cost plus 10			
F. W. D. Riess		100	(Govt. to guarantee parts)			3500§	.....
Nash	45 days	250	5000	2465 (Quad) Govt. spec. with exceptions			
F. W. D.	July 1	120	(910 Govt. spec. in 4 mo.)			3200†	.....
Stegeman		100	2000	2515*	.....	2945§	.....
Witt-Will		.....	12	2300†	.....	.....	.....
Diamond-T	Immed.	250	975	2125	.....	2965	.....
Day-Elder		.....	.....	1200†	.....	1687†	.....
Armleder	60 days	75	.....	2150†	.....	2900†	.....
Denby	August 1	200	1050	2425†	.....	.....	.....
Wilcox	90 days	400	4800	2915†	.....	.....	.....
Sullivan		150	.....	2200†	.....	3058†	.....
Maccar	40 days	10	.....	2350†	.....	3400†	.....
Hannay Motors		2	3700	.....	.....	.....	.....
United	30 days	25	.....	2300†	.....	2870†	.....
						3375§	
United F. W. D.	Sept.	20 up	....	3250 or cost plus 10%			
U. S.		500	.....	.....	.....	.....	.....
Indiana		50	.....	2562	.....	3236	.....
Willys-Overland		500	10,000	Cost plus 15%			
Bethlehem	45 days	100 up	5000	2175	190	.....	.....
Hurlburt		.....	.....	2350†	.....	3900†	.....
				2550* Body inc.		4250§	.....
Rowe		.....	500	2595 Body inc.			
Locomobile	Immed.	100 up	....	.....	.....	3871†	.....
						4379§	Inc. body
Service	60 days	100	.....	2900*	235	.....	.....
				2500†	.....	3000†	.....

	DELIVERIES			PRICE			
	After Order	Per Mo.	Total	1½-Ton	A Body	3-Ton	B Body
International	.....	.....	.....	.....	.....	$4175§	.....
Clyde	30 days	1000	2600	$2465†	.....	3290	.....
Beck	60 days	12	.....	1950†	.....	.....	.....
Deneen	90 days	25 up	.....	2996†	.....	.....	.....
Packard	.....	500	3000	3474*	Inc. body	4125§	Inc. body
Packard	.....	.....	.....	3082	Inc. body	3536	Inc. body
Packard	.....	.....	.....	2803	.....	3364	.....
Govt. spec. with certain exceptions							
Atterbury		40	500	.....	.....	3500§	.....
Acme		50	600	.....	.....	3000§	.....
Noble		.....	50	2100†	.....	.....	.....
Transport		8⅓	100	.....	.....	4380§	.....
Cunningham	January 1	50	200	.....	.....	3000	.....
Strand		250	.....	.....	.....	.....	.....
Peterson		10	100	.....	.....	.....	.....

†Bidding on makers' specifications.
*Bidding on Government Type A military truck.
§Bidding on Government Type B military truck.
‡Bidding on makers' specification, extra charge for steel wheels.

½-Ton, ¾-Ton and 1-Ton Army Trucks

BIDS ON 100 TO 200 OPEN JUNE 11

	DELIVERIES		PRICES			
Manufacturers	After Order	Per Mo.	½-Ton	¾-Ton	1-Ton	Remarks
Metropolitan Motors, Inc.	30 da.	40	.....	$895.00	.....	
Bethlehem Motors	10 da.	.....	.....	.....	$1095.00	
Norwalk	30 da.	75	.....	1135.00	.....	
Economy	30 da.	25	$708.75	.....	.....	
Commercial Vehicle Motors Co	2 da.	.....	745.00	.....	1190.00	
Seneca		75	643.00	.....	.....	
Commerce Motor Car Co.	Bidding on 1000, no price					
Forschler Motor Truck Co.	7-19	4	.....	1625.00	1825.00	
Maxwell	.....	.....	.....	.....	795.00	
Superior Motor Truck Co.	10 da.	20	.....	.....	1250.00	
Vim	6-20	.....	875.00	.....	.....	Price according to body and model.
Koehler	Immed.	20	.....	.....	1075.00	
Beck M. T. Co.	60 da.	12	.....	.....	1080.00	Total 150
Packard	.....	.....	.....	.....	1860.00	After 8-10, $2232
Henney	10 da.	3	.....	.....	1440.00	Price change after first 3 mos.
Studebaker	.....	.....	663.75	.....	900.00	
Garford	3 wks.	100	.....	1657.50	1855.00	
Selden Truck Sales		25	.....	.....	1810.80	
Willys-Overland	24 hrs.	1375	722.50	.....	.....	
Lippard-Stewart	2 wks.	.....	1140.00	1740.00	2250.00	Worm drive, price with body
Abbott & Downing		5	.....	.....	1700.00	
Nash Motors Co.	30 da.	200	.....	.....	1232.50	
Rush Co.	30 da.	50	750	.....	.....	Body extra
Martin Truck & Body Co.	Immed.	10 up	....	900.00	.....	Body extra, total 400
Brinton M. T. Co.		25	.....	.....	1125.00	Chassis only
I. H. C.	10 da.	80	.....	1160.00	.....	Body extra
Commerce M. C. Co.	7-1	60	.....	.....	1240.00	
Republic	.....	.....	.....	.....	1350.00	
Federal	.....	50	.....	.....	1485.00	Or, cost plus 10%
Reo	30 da.	200	.....	946.00	.....	Complete
Deneen	Immed.	Model 10 chassis,		1289.00	Body, 225.00	
		Model 12 chassis,		860.00	Body, 150.00	
Rainier	.....	.....	875.00	1020.00	1875.00	Chassis only, body extra
Collier M. T. Co.	4 mo.	50	.....	900.00	.....	After Jan. 1, $1000

ATTACHMENT MAKERS

Illinois Auto Truck Co.	Immediate delivery, 15 per mo.	Fords, with attachment	$660.00
		Dodges, with attachment	1050.00
Smith Motor Truck Co.	24 hrs. 100 to 200 per da.	Ford, ½-ton	627.46
		Ford, ¾-ton	627.46
	Car with attachment	Dodge, ¾-ton	1102.50
		Dodge, 1-ton	1102.50
Hudford		Attachment for Ford	397.50
	With body	Attachment with Ford	835.00
Maxfer	Delivery 30 da.	Ford, with attachment	784.30
	Delivery, 30 da. 200 per mo.	Dodge, with attachment	1246.60

Licenses for N. Y. Owners

Kelly-Cromwell Law Widens Power of Revocation—Punishments More Severe

NEW YORK, June 9—After July all operators of motor vehicles in New York will be required to register and obtain certificates from the Secretary of State to permit them to drive. Governor Whitman has signed the Kelly-Cromwell bill, which makes this necessary. The bill applies to every operator of a motor vehicle in New York State who drives his car in New York City 10 times or more in one year.

Under this measure, which has been vigorously opposed, owners of cars are placed in a class distinct from those who operate cars for pay in that they will not be required to undergo an examination. They will receive licenses to drive from the Secretary of State upon payment of a $1 fee.

Under the terms of the new measure, those who operate cars while intoxicated will be guilty of a misdemeanor, and those who injure pedestrians and fail to report the matter to the police or surrender themselves, will be guilty of a felony, punishable by a fine of $500 or for imprisonment, not to exceed 2 years, or both. Convictions for these two offenses must be reported to the Secretary of State, and upon a recommendation of the trial court he may suspend the license of the person convicted, and has the power to revoke the license. In the case of third offenders, the Secretary of State may revoke licenses and no new license can be issued for a period of 6 months after the date of conviction.

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Clifton Re-Elected N. A. C. C. President

NEW YORK, June 8—More than ninety automobile manufacturers were represented at a record meeting of the members of the National Automobile Chamber of Commerce held yesterday, when Charles Clifton, head of the Pierce-Arrow Motor Car Co., was re-elected president; Wilfred C. Leland, vice-president of the Cadillac Motor Car Co., was elected vice-president of the chamber, with Hugh Chalmers, Windsor T. White and Herbert H. Rice as division vice-presidents; R. D. Chapin, president of the Hudson Motor Car Co., was elected secretary; George Pope, treasurer, and Alfred Reeves, general manager.

John F. Dodge, president of Dodge Bros., was elected to the directorate of the chamber, the other directors being Hugh Chalmers, R. D. Chapin, C. W. Churchill, Charles Clifton, J. Walter Drake, C. C. Hanch, W. C. Leland, Alvan Macauley, W. E. Metzger, R. E. Olds, Carl H. Pelton, H. H. Rice, W. T. White and J. N. Willys.

Members of the chamber voted $30,000 out of the treasury for Liberty loan bonds, and arranged to carry bonds for employees.

A special committee was directed to consult with automobile and motorcycle manufacturers regarding construction of cars and motorcycles so that muffler cut-outs cannot be used except with a screw plug or other device that can be handled only in a shop.

The export committee, of which H. W. Ford, president of the Saxon Motor Car Co., is chairman, delivered a report on the comprehensive plans of the committee for developing sales of U. S. A. automobile products in the export field.

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Liberty Elected N. A. C. C. Member

NEW YORK, June 8—The Liberty Motor Car Co., Detroit, has been elected a member of the National Automobile Chamber of Commerce.

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Minneapolis Steel To Build Engines

MINNEAPOLIS, MINN., June 14—The Minneapolis Steel & Machine Co. is spending $325,000 on a plant in which it will undertake the manufacture of truck and tractor engines.

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Ingram-Hatch Motor Corp. Reorganized

ROSEBANK, S. I., June 13—At the annual meeting of the stockholders of the Ingram-Hatch Motor Corp., held at the company's factory here recently, the following officers were elected: Joseph W. Cody, New York, president; Joseph A. Ingram, Rosebank, vice-president; James J. McCullum, New York, treasurer; John T. Oates, Brooklyn, secretary. Walter P. Hatch resigned as the vice-president and sales manager and Nelson T. Gutelius was appointed sales and advertising manager.

The Ingram-Hatch Motor Corp. is capitalized at $1,000,000, but negotiations are under way to increase the capital and to greatly expand manufacturing facilities. The corporation will soon announce an air-cooled, two-cycle oil engine for stationary, marine, farm tractor and motor truck purposes. The Ingram four-cycle, air-cooled engine and double friction-drive passenger car are the main features of the line. This engine will also be manufactured for trucks of 1 to 5 tons capacity.

1% Tax on Cars Is Probable

Senate Finance Committee Agrees on Graduated Levy—Business Vehicles Not Taxed

WASHINGTON, June 12—The Senate finance committee has finally drafted the section of the war revenue bill under which motor vehicles will be taxed, and it has fixed this tax at 1 per cent, roughly, on the selling price of passenger cars. No tax whatever is provided for on cars or trucks used exclusively for business. A total of $40,000,000 is expected to be raised.

Under the schedule agreed upon taxes would be assessed as follows:

Machines originally listed at $500 or less, $5; from $500 to $750, $7.50; from $750 to $1,000, $10; and for those of greater value than $1,000, $5 for each $500 above that amount.

A discount of 10 per cent per year from the original list price of each machine would be permitted.

Members of the committee express the view that this section will be agreed to on the floor of the Senate, and that the House will also approve it.

The committee to-day adopted the British system of taxation on excess corporation war profits as part of the War Revenue bill. This tax is to yield approximately $250,000,000 a year. The calendar years 1911, 1912 and 1913 will be taken as a basis for striking the average of pre-war profits.

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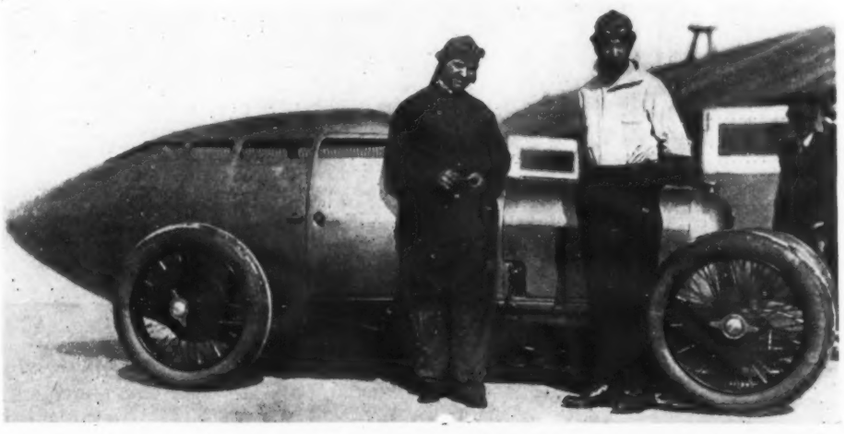
New York Headlight Bill Signed

NEW YORK, June 11—Governor Whitman has signed the Hewitt bill, which prescribes the manner in which headlamps must be controlled in New York State. Under its terms, light rays must not rise higher than 42 in. from the roadway at a distance of 75 ft. from the car. The lamps must also illuminate an object placed 10 ft. from each side of the front of the car.



Barney Oldfield, at the left, and his new Miller racing car with which he made 102 m.p.h. on the Chicago speedway recently in tryouts for the coming speed events on that track

Workers Buy Liberty Loan Bonds

Employees of Plants Throughout Automobile Industry Subscribe for Millions

DETROIT, June 9—Workers in the factories of the automobile industry are responding liberally to their employers' appeals for subscription to the Liberty bond loan. Canvassing of Ford Motor Co. employees is but half completed, and returns show subscriptions of $2,009,000; an army of workers appealing to fellow employees at the Willys-Overland Co. plant at Toledo yesterday resulted in more than 10,000 subscriptions; Henry Leland, president of the Cadillac Motor Car Co., personally appealed to the employees of that concern, and results from one-half of the factory display subscriptions totaling $434,000; the returns at the Packard Motor Car Co. showed that, up to last night, 8850 workers had purchased $589,500 worth of bonds; the Chalmers Motor Co. announced that its employees' subscription of $100,000 had been oversold and that an additional subscription for $100,000 was made; the Studebaker Corp. took $250,000 worth of bonds for its workers; Dodge Bros., holding noon-day meetings, have sold more than $1,500,000 worth of Liberty bonds to employees; more than 950 workers of the Northway Motor Co. purchased $72,050 worth; workers at the Fisher Body Corp. increased their subscriptions from $100,000 to $150,000; officials of the Detroit Twist Drill Co. have underwritten $10,000 for their workers, and the Detroit Lubricator Co. subscribed $25,000. The Aluminum Castings Co. has taken $40,000, and the Detroit Steel Spring Co. subscribed $30,000 worth of bonds for employees.

Liberty bonds worth $135,000 have been subscribed for by 1800 employees of the Standard Parts Co., Cleveland. Still larger subscriptions are expected.

Employees of the Olds Motor Works, Lansing, Mich., subscribed to $100,000 worth of Liberty bonds.

A committee has been appointed at Lansing, Mich., composed of B. S. Gier, general manager of the Gier Pressed Steel Co., Donald E. Bates, treasurer of the Reo Motor Car Co. and Drury L. Porter, secretary and treasurer of the Auto Wheel Co., to perfect plans for disseminating information and also to work out a uniform system by which workers can purchase Liberty bonds. R. E. Olds of the Reo Motor Car Co. personally subscribed to $100,000 worth of bonds and W. K. Prudden, of the Prudden Wheel Co., has subscribed to a like amount. Reo employees subscribed for $210,000 worth.

Subscriptions at Flint, Mich., amount to: Buick Motor Co., $259,350; Champion Ignition Co., $25,900; Chevrolet Motor Co., $10,500; Dort Motor Co., $34,250; Imperial Wheel Co., $3,000; Mason Motor Co., $163,500; Michigan Motor Castings Co., $8,200; W. A. Paterson Co., $5,150; W. F. Stewart Co., $29,600; Weston-Mott Co., $75,000.

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Owen Wins in Contract Case Appeal

ALBANY, N. Y., June 13—R. M. Owen & Co. were rewarded a verdict of $31,469.58 and costs by the court of appeals, here, in the appeal of the suit brought by Gustave Poppenberg, Buffalo, N. Y. Mr. Poppenberg charged violation by R. M. Owen & Co. to handle Reo cars in his suit brought early in 1913. R. M. Owen & Co. made a counter claim of contract violation, which was granted. A decision in favor of R. M. Owen & Co. was handed down by a jury in the supreme court in Buffalo, April, 1913.

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Perlman Rim Suit Dismissed

(*Continued from page* 1111)

much new evidence ready to introduce when the case was dismissed.

The Perlman patent No. 1,052,270 was issued on an application filed June 29, 1906, which was a continuation of, and substitute for, an application filed May 21, 1906. Perlman's idea, he said, was to patent "a wheel whose demountable rim is bodily detachable from its fixed rim and felly, means being provided for firmly and rigidly retaining the demountable rim and the fixed rim and felly while in use, such means at the same time being adapted to be manipulated for enabling ready, rapid and easy removal of the demountable rim when desired." Features of the invention were the use of the separating wedge, the bolt and the nut in connection with a short stem lug and the provision of an air space between the fixed and demountable rim.

Suit was filed by L. H. Perlman against the Standard Welding Co., charging infringement of the patent, Oct. 7, 1913, in the United States district court for the Southern District of New York, and a decision was handed down in Perlman's favor by Judge Hunt Aug. 18, 1915. This decision was subsequently upheld by the United States circuit court of appeals for the second circuit in February, 1916. An injunction prohibiting the further manufacture and sale of demountable rims by the Standard Welding Co. was issued March 8, 1916.

The Perlman Rim Corp. was formed soon after this with $10,000,000 capital, and negotiations were concluded whereby a number of manufacturers took out licenses to manufacture demountable rims under the Perlman patent. The Perlman Rim Corp. immediately entered into the active manufacture of rims, a large plant being secured in Jackson, Mich., which, it is stated, is now producing approximately 4000 rims a day.

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House Passes Webb Bill

WASHINGTON, June 13—The Webb bill, authorizing combinations of persons, partnerships or corporations for carrying on export trade, was passed by the House to-day. The bill has the approval of the administration.

Eclipse Wins Starter Drive Suit

Appeals Court Upholds Decision That License Agreement with Bijur Is Valid

NEW YORK, June 12—A decision has been rendered by the U. S. circuit court of appeals in favor of the Eclipse Machine Co., Elmira, N. Y., and Vincent Bendix, Chicago, in the appeal of the suit brought against them by the Bijur Motor Lighting Co., Hoboken, N. J. This decision by Judges Coxe, Ward and Hough upholds the decision of Judge Hazel in the U. S. district court for the western district of New York, handed down in July, 1916. The suit was brought by the Bijur company in 1914, charging infringement by the Bendix gear used in motor starting apparatus of patent No. 1,095,696 granted to Joseph Bijur in May, 1914, and covering a starting motor gear.

Previous to the suit an alleged contract was entered into between Vincent Bendix and Joseph Bijur, by which Bendix and the Eclipse Machine Co. were given the right to manufacture the Bendix drive device under the Bijur patent. The Bijur company declared this agreement to consist only of tentative arrangements and contended that it was not a contract since it had not been cast upon or authorized by the board of directors.

The court held that the agreement was duly executed by the Bijur company and that it was bound by it. The agreement provides that Vincent Bendix is to receive a license under the Bijur patent, exclusive against all others except the Bijur Motor Lighting Co., which itself retained the right to make the patented article. Vincent Bendix under the agreement acquires the right to grant a sublicense exclusively to the Eclipse Machine Co.

The case is of more than ordinary interest because the type of drive for starting motors involved is in almost universal use on American made cars. The Eclipse Machine Co. commenced making these devices in January, 1914, under a license from the inventor Vincent Bendix, and in May of the same year, a patent for a similar device was issued to Bijur.

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110 Mechanics To Go To France

WASHINGTON, June 14—The Government has selected 110 mechanics from automobile factories who will be sent to France to study the manufacture of aviation engines. Of these sixty-three are from Detroit and sixteen from Indianapolis. They will spend several months abroad and on their return will supervise airplane engine building here.

In the great drive by the United States to place 4000 airplanes on the front next spring, 20,000 mechanics will be required. These will be drawn largely from repair shops and garages.

Rapid progress is being made at the big Government aviation fields, especially that at Dayton, Ohio.

Personals

SOUTH BEND, June 9—James G. Heaslet, vice-president in charge of engineering for the Studebaker Corp., has retired, but will continue a member of the board of directors, and has been retained in the advisory capacity of consulting engineer. His place as vice-president has been taken by M. F. Wollering, formerly production manager. Mr. Wollering, who has been associated with the Studebaker Corp. for many years, will be in charge of manufacturing at the Studebaker plants in Detroit, South Bend and Walkerville. He is succeeded by Charles Bockus.

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CLEVELAND, June 9—C. W. Miller has been made general manager of the Michigan plant of the Steel Products Co., Cleveland.

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GRAND RAPIDS, MICH., June 13—B. S. Chamberlain is now traffic manager of the United Motors Co. He was formerly traffic agent of the Grand Rapids Board of Commerce.

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ST. LOUIS, MO., June 11—Charles R. Porter, for a number of years identified with the motor truck trade here, has been named salesmanager for the Globe Motor Truck Co. of East St. Louis, Ill., which factory is turning out trucks. Agencies will be appointed in the west first.

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DETROIT, June 12—Hugh Chalmers has been appointed city chairman of the Red Cross campaign to raise $1,500,000 in Detroit.

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MANITOWOC, WIS., June 8—Louis Rasmussen, general superintendent of the Wisconsin Aluminum Foundry Co., for the last 5 years, has resigned to accept a position at Marshalltown, Ia. He was tendered a banquet and presented with a gold watch upon leaving.

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NEW YORK, June 13—E. Ralph Estep, formerly advertising manager of the Packard Motor Car Co., has returned from the front in France, where he has been making a study of application of motor vehicles and aircraft in war.

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KANSAS CITY, MO., June 8—George O. Simpson, for the past 7 years manager of the Philadelphia branch of the B. F. Goodrich Rubber Co., has been appointed manager of the Kansas City branch. He succeeds F. A. Oberheu.

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DETROIT, June 12—G. E. Toole has been appointed in charge of the service organization of the Wetmore-Quinn company. Mr. Toole was formerly production manager of the Champion Motors Co. of Fulton, Ill.

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STREATOR, ILL., June 11—H. M. Gillian, representing the Los Angeles, Cal., Motor Car Co., is here with a view of interesting business men in a proposed branch plant for assembling purposes.

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DETROIT, June 9—E. B. Turrill has resigned from the advertising department of the Saxon Motor Car Corp. to join the American Red Cross ambulance corps. He had been with the Saxon company for 3 years.

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AKRON, OHIO, June 9—L. J. Myers has been appointed to take entire charge of sales for the Amazon Rubber Co.

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TOLEDO, June 9—John D. Carmody is now covering Nebraska and North and South Dakota for the Champion Spark Plug Co., Toledo. He was formerly with the U. S. Rubber Co., Chicago.

George W. Shane, formerly with the Chicago Chamber of Commerce, is now with the Champion Spark Plug Co.

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DETROIT, June 9—J. M. Hill has joined the executive staff of the new Steamotor Truck Co. of Chicago, organization of which was recently announced in THE AUTOMOBILE. Mr. Hill is widely known in the industry, and was at one time the United States commissioner of motor truck transportation for the Panama-Pacific Exposition.

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PEORIA, June 9—W. H. Taylor, of Chicago, has been appointed resident manager of the Peoria branch of the U. S. Tire Co.

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DETROIT, June 13—Clarence Schneider has been appointed superintendent of the Titan Motors Co. He was formerly production manager of the Parker Rust-Proof Co.

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DETROIT, June 8—Edward S. Babcox, advertising manager of the Firestone Tire & Rubber Co., Akron, has been elected vice-president of the Association of National Advertisers.

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WICHITA, KAN., June 9—F. A. Gustafson has been appointed superintendent of the painting department of the Jones Motor Car Co. He was with the Velie company for 8 years. R. I. Collins has become vice-president and a director of the company. He has been for a number of years connected with banking and lumber interests in the South.

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CLEVELAND, June 12—E. A. McKee has resigned from the Maxwell Motor Co., Inc., and joined the F. B. Stearns Co. of Cleveland. Mr. McKee will handle Michigan and Indiana territory.

Factory Activities

DANVILLE, ILL., June 11—The Moore Motor Vehicle Co., Minneapolis, Minn., has concluded a deal for the purchase of the abandoned car shops at Danville, Ill. The business men of Danville take $25,000 worth of stock in the corporation. It is promised that 400 men will be given employment manufacturing cars before the close of next year.

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CLEVELAND, June 12—The Truck Attachment Co. has started in business in Cleveland making truck attachments and auxiliary transmissions. The company has located in the former Carey Looping Co. plant on West Eleventh Street.

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WATERTOWN, WIS., June 9—The Morgan Screw Corp., Newport, R. I., which has been making arrangements to move its plant and headquarters here, where local capital subscribed to a $50,000 capital stock interest and provided a suitable factory building, has notified the local committee in charge that it will be obliged to delay consummation of the deal until the government's course with respect to control of the steel industry of the nation is more definitely determined.

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KALAMAZOO, MICH., June 12—The Lane Truck Co., of this city, is manufacturing a 3½ ton truck, selling at $3,000. Company will also engage in the manufacture of 1½ ton truck in the near future.

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DETROIT, June 12—The Michigan Screw Co., which, by additional buildings, added 35,000 sq. ft. of space to its production department, last year, will be equipped this season to handle its business with greater ease than a year ago. The company, which is now employing more than 300 men, has had to resort to considerable night work during the last 12 months.

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DETROIT, June 13—The Titan Motors Co. is taking over the plant of the Bour-Davis Motor Car Co., for the manufacture of engines for army trucks. The plant has a floor space of 56,000 sq. ft.

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DECATUR, ILL., June 9—The Pan-American Motors Co. has closed the Chicago branch, and all patterns, stock and machinery have been shipped to Decatur.

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FLEETWOOD, PA., June 9—Fire damaged the plant of the Fleetwood Metal

Body Co. to the extent of $65,000. The Packard Motor Car Co. building was also damaged and a number of chassis were completely destroyed.

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GREEN BAY, WIS., June 9—The first Oneida truck to be manufactured by the Oneida Motor Truck Co., incorporated recently with a capital stock of $300,000, left the shops on Wednesday, June 6, and marked the beginning of the initial output of commercial cars by the new company. The truck is equipped with a Continental motor, Hele-Shaw clutch, Cotta gearset, Spicer universals, Timken front and rear axles, Bosch ignition, etc. Worm drive is employed.

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DETROIT, June 9—The Harroun Motors Corp. will be producing complete cars within 2 weeks. All of the machinery has been installed and materials have been storing up for several months, and the company is now ready to engage in steady output.

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DETROIT, June 9—The new plant of the Saxon Motor Car Corp. at Springwells, in West Detroit, has reached the point where windows and some machinery are being installed, and the company contemplates the storing of materials in the near future. It is expected that the new plant will be occupied before the first of September.

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TWO RIVERS, WIS., June 9—The Two Rivers Plating Works, which specializes in plating and retinning aluminum and other castings for manufacturers, has completed work on a large factory addition, which is now being equipped and will be ready for service about June 15. The capacity thereby will be increased from 50 to 75 per cent.

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ALMA, MICH., June 9—The Republic Motor Truck Co., of this city, will shortly erect an assembly plant at a cost of $175,000 in a large center in California. The plant will give employment to 300 men. The Republic company is now turning out 100 trucks per day, and is planning to double its capacity within the next few months and to manufacture about 50,000 trucks of two models, one similar to the present Dispatch and the other with a ¾-ton capacity, in 1918.

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PHILADELPHIA, June 9—The Budd Wheel Corp. has leased the ground floor of the Quaker lace mill at Twenty-second Street and Lehigh Avenue for office and manufacturing purposes. The company is subsidiary to the Budd Mfg. Co., maker of all-steel automobile bodies.

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GRAND RAPIDS, MICH., June 9—The Samson Trailer Co. has purchased ten acres of land adjoining the property of the United Truck Co. and will erect a factory for the manufacture of trailers.

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GRAND RAPIDS, MICH., June 12—The Michigan Aircraft Co., which was formed here several months ago, as was told in a past issue of THE AUTOMOBILE, has completed its plant and will shortly embark on the production of airplane engines. E. J. Clark is president and treasurer of the company, Bert Kenyon is secretary and R. F. Seyferth is assistant secretary and treasurer. Anthony Stadlman, one of the pioneers in the American airplane industry, is the chief engineer. The company will build two types of machines, including the Curtiss standard eight-cylinder, 100-hp. type for military machines and for flying boats.

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RACINE, WIS., June 9—For the second time this year S. C. Johnson & Son have announced a voluntary increase in wages throughout their entire organization. The payroll includes 250 men and women.

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COVINGTON, KY., June 11—The United States Motor Truck Co. has purchased a large plot of land adjoining its factory here and will erect an addition.

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OSHKOSH, WIS., June 9—The Challoner Co., Oshkosh, Wis., founder and machinist, has taken a contract to manufacture the Giant grip anti-skid device for commercial cars, designed by William H. Krug, a member of the Challoner staff and its subsidiary, the Giant Grip Co., organized to market the new grip, which consists of a set of clamps fastened permanently to the spokes of wheels equipped with solid tires. These clamps support chains going around the tire. The chains are removable and any number may be used.

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ECORSE, MICH., June 12—The Ecorse Foundry & Machine Co. has completed its large plant in this city and will start manufacture of gray iron castings at a capacity of 100 tons per day. Officers of the company are: B. F. Everitt, president; W. A. C. Miller, vice-president, and A. J. Kinnucan, treasurer and general manager.

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TRAVERSE CITY, MICH., June 9—The Napoleon Motor Co., of Napoleon, Ohio, will move its plant to this city in the near future. The company states that it has orders for 5000 passenger cars and 300 trucks.

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BATTLE CREEK, MICH., June 11—The Advance-Rumely plant in this city is arranging to manufacture $2,000,000 worth of oil-pull tractors this year. The force of 400 men now employed in the plant will be doubled.

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LANSING, MICH., June 12—A scarcity of common labor has forced the Lansing companies to employ women workers. Companies now employing the feminine sex in large numbers are the Reo Motor Car Co., the Olds Motor Works, the Gier Pressed Steel Co., the Dail Steel Products Co., and the Lansing Stamping & Tool Co.

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SOUTH BEND, IND., June 11—The Lamson Motor Truck & Tractor Co., a $2,000,000 Chicago enterprise, which expects to employ 500 men, is to move to Elkhart from Chicago. Architects are now working on plans for a concrete, brick and steel building which will form the first unit of a new plant. The company was organized 2 years ago with G. W. Lamson as president and G. D. Harris as vice-president. Five types of trucks are manufactured under the Lamson patent, from ½ to 5-ton capacity.

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WAUKESHA, WIS., June 9—The Spring City Foundry Co., specializing in motor castings and parts, has awarded all contracts for the erection and equipment of a one-story foundry addition, 80 by 140 ft. Ground was broken June 8 for the new building, which will be of structural steel and brick, on concrete foundations, with a large area of glass walls and roof.

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OAKLAND, CAL., June 11—The Fageol Motors Co. held ground-breaking exercises June 9, celebrating the beginning of work on the $500,000 plant in which Fageol cars, trucks and tractors will be manufactured. The ceremonies, sports, etc., were held under the auspices of the Oakland Chamber of Commerce.

PRODUCTION

TRENTON, N. J., June 11—The Thermoid Rubber Co. has increased its yearly output of Thermoid brake lining by 30 per cent through the addition of new hydraulic press equipment. The output for 1916 totalled over 9,000,000 ft.

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SYRACUSE, June 11—Shipments of cars made by the Franklin Automobile Co. during May showed an increase over the month of April of 86 per cent. At the same time unfilled orders amounted to 2200 cars, equivalent to 9 weeks' production.

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DETROIT, June 11—The Hupp Motor Car Co. is 600 cars behind in its deliveries. The company is producing cars as rapidly as materials markets allow.

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DETROIT, June 13—Production will start in the Detroit plant of the Covert Gear Co. in 3 weeks.

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CLEVELAND, June 11—Business of the Jordan Motor Car Co., in the middle, southwestern and northwestern sections has increased 50 per cent in the past 50 days. Shipments of Jordan cars in May totalled 287, making the total of factory sales $2,703,750. Production planned to Sept. 1 was 2000 cars to be built at a maximum rate of ten per day. Of these, 1545 have been shipped, about one-third of the output being four-passenger cars. Orders on hand June 10 for immediate shipment totalled 236.

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To Sell Gibney Tire Factory

CONSHOHOCKEN, PA., June 11—Proposals for the purchase of the solid tire factory of the Gibney Tire & Rubber Co. will be received by Henry C. Thompson, Jr., 2015 Land Title Bldg., Philadelphia, until June 25. The plant has a capacity of 400 tires a day and there are branch offices and service stations in Philadelphia, Newark, New York, Boston, Detroit, Chicago and San Francisco.

Steel Situation Little Changed

War Necessities Will Take Precedence in Materials Markets — Some More Favorable Conditions

NEW YORK, June 13—Charles Schwab's statement to the Detroit convention of salesmen that the automobile industry would not be restricted by available steel seems to require a little explanation. Taken with its context it seems to apply to automobile products which can be classed as war necessities; it does not necessarily do so to all commercial products. While the statement is encouraging, it is no excuse for any manufacturer to slacken his efforts to provide for the future.

Government orders are coming through slowly, but there is still no clear indication of their ultimate amount. Structural steel for military cantonments and navy yard additions has been ordered, and the sheet output will be affected by government orders for a quantity of cooking stoves for the army. Meanwhile steel makers are looking everywhere for scrap, since they are being cramped by the condition of the pig iron market where prices are still advancing. Blast furnace coke has reached $10 and is rising steadily.

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Six Manufacturers Elected N. A. A. A. J. Associate Members

CHICAGO, June 8—Six manufacturers were elected to associate membership in the National Assn. of Automobile Accessory Jobbers, and fourteen jobbers were elected to regular membership at the meeting of the board of directors held at Excelsior Springs, Mo., May 30-June 1. Manufacturers elected are:

Bailey Non-Stall Differential Co., Chicago.
Champion Spark Plug Co. of Canada, Windsor, Ont.
Colorado Tire & Leather Co., Denver, Col.
Connecticut Telephone & Electric Co., Meriden, Conn.
Standard Woven Fabric Co., Walpole, Mass.
Victor Manufacturing & Gas Jet Co., Chicago.

Jobbers elected to regular membership are:

D. W. Alderman, Jr., Florence, S. C.
Borderland Auto Supply Co., El Paso, Tex.
Dine-DeWees Co., Canton, Ohio.
Denver Auto Goods Co., Denver, Col.
Foster Auto Supply Co., Denver, Col.
C. W. Greene Co., Tampa, Fla.
Geller, Ward & Hasner Hardware Co., St. Louis, Mo.
Hilliard & Yokes, Erie, Pa.
Johnson Tire Co., Montgomery, Ala.
Master Sales Co., Omaha, Neb.
Northwestern Auto Supply Co., Billings, Mont.
Price Auto Equipment Co., Wichita, Kan.
Saskatchewan Motor Co., Regina, Sask.
Williams Hadware Co., Clarksburg, W. Va.

The next meeting will be held the last week in August or the first in September at a place to be decided later.

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150 Chevrolet Executives Meet

FLINT, MICH., June 9—The Chevrolet Motor Co. was host last night to 150 executives of the Chevrolet and Mason companies at a banquet held in this city. J. H. Newmark, advertising manager, presided as toastmaster, and the principal discussions were made by A. B. C. Hardy, vice-president, and A. W. Sills, general sales manager, who discussed early motor car days and told of the growth of the Chevrolet company. Mr. Sills stated that there are more than 4000 Chevrolet dealers on this globe. Other speakers included President Begole and Treasurer W. S. Ballenger; W. W. Willett, general manager of the Chevrolet Motor Co., of Bay City, Mich., A. C. Mason, president of the Mason Motor Car Co., and H. L. Innes, factory manager of the Chevrolet company.

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NEW COMPANIES

NEW YORK, June 9—The Motor Accessories Corp., incorporated in Delaware for $2,000,000, plans to open two branches in every State in the Union to handle nationally advertised accessories for automobiles and trucks. The corporation will sign up one service station in each town, and there will be a branch in New York and one in Chicago, with sub-stations in each city. The first plants will be opened in Newark, N. J., with Philadelphia, Buffalo, Pittsburgh, Brooklyn, New York, Denver, Chicago and Detroit following.

The corporation will operate its own plant in Sandusky, Ohio, manufacturing dry cells, grease guns, air pumps and carbureters. Some of the men behind the organization are: R. W. Thompson, of Thompson, Warren & Pelgram, attorneys, 52 Wall Street; Henry L. Redfield, 16 Court Street, Brooklyn, real estate; W. Morris Griscom, Philadelphia, and H. F. Vortkamp, formerly with the Mayer Carbureter Co., and the Candler Radiator Co.

The corporation has opened offices at 170 Broadway.

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BOSTON, June 11—Seamless Rubber Co., Inc., has been organized with a capital of $1,500,000, composed of 10,000 shares of 7 per cent preferred and 5000 common shares of $100 par value. The new corporation will take over the business and property of the Seamless Rubber Co. of Connecticut, which has been purchased from the receiver.

The price paid for the Seamless property was about $700,000. The receiver will immediately pay in full the claims of all creditors, amounting to $600,000, with interest.

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NEW YORK, June 10—The Delion Tire and Rubber Co. has been re-incorporated for $3,500,000 under the laws of Delaware, and plans to build additions to its present plant to enable it to double its present capacity.

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KOKOMO, IND., June 9—The Remy Brothers Tractor Co. has been organized here with a capital of $500,000. Officers of the company are: President, Frank Remy; vice-president, Richard Ruddell; secretary and treasurer, Perry Remy. Stockholders include Frank Remy, Perry Remy, George W. Charles, A. A. Charles, A. G. Seiberling, Elwood Haynes, A. B. Armstrong, Rulo S. Conrad, A. V. Conrad, J. W. Johnson and Courtland Van Camp. Active work on the erection of a large plant will begin within the next 10 days.

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BUFFALO, N. Y., June 9—The Hewitt Rubber Co. will increase its capital stock from $500,000 to $1,000,000 and J. H. Kelly and F. V. Springer, of the Republic Rubber Co., Youngstown, Ohio, will become associated with H. H. Hewitt in the management and control of the Hewitt company. Plans are contemplated for the enlargement of the plant to a capacity of 5000 tires per day.

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Oakland Sensible Six Now $945

NEW YORK, June 4—Price of the Oakland Sensible Six is now $945, having been increased $70 June 1. In THE AUTOMOBILE for June 7 the new price was erroneously given as $1,015.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum, lb.	.59	.60	.60	.60	.60	.60	+ .01
Antimony, lb.	.22½	.19½	.19½	.19½	.19½	.19½	— .03
Bessemer Steel, ton	85.00	85.00	85.00	85.00	85.00	90.00	+5.00
Copper, Elec., lb.	.33	.33	.33	.33	.33	.33	...
Copper, Lake, lb.	.31	.31	.31	.31	.31	.31	...
Cottonseed Oil, bbl.	16.35	16.35	16.25	16.40	16.50	16.35	...
Fish Oil, Menhaden, Brown	.86	.86	.86	.86	.86	.86	...
Gasoline, Auto, bbl.	.24	.24	.24	.24	.24	.24	...
Lard Oil, prime	1.95	1.95	1.95	1.95	1.95	1.95	...
Lead, 100 lb.	11.25	11.62½	11.62½	11.75	11.75	11.75	+ .50
Linseed Oil	1.27	1.27	1.27	1.27	1.27	1.27	...
Open-Hearth Steel, ton	85.00	85.00	85.00	85.00	85.00	90.00	+5.00
Petroleum, bbl., Kans., crude	1.70	1.70	1.70	1.70	1.70	1.70	...
Petroleum, bbl., Pa., crude	3.10	3.10	3.10	3.10	3.10	3.10	...
Rapeseed Oil, refined	1.40	1.40	1.40	1.40	1.40	1.40	...
Rubber, Fine Up-River, Para	.74½	.74½	.74	.74	.74	.73	— .02
Rubber, Ceylon, First Latex	.76	.78	.77	.76	.76	.74½	— .04½
Sulphuric Acid, 60 Baume	1.50	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lb.	58.00	56.00	56.50	57.00	57.00	57.00	—1.00
Tire Scrap	.06½	.06½	.06½	.06½	.06½	.06½	...

Materials Tractor Problem

Increase in Use on Farms Is Retarded by Handicaps in Production

WASHINGTON, June 11—The situation with respect to an increased use of farm tractors has improved somewhat, according to Dr. B. F. Galloway, assistant to the Secretary of Agriculture, but the desired improvement is not expected by Dr. Galloway until the more immediately pressing matters of war organization, taking in the question of munitions, etc., have been more fully taken care of.

This means that the raw material necessary in turning out tractors for farm use cannot be secured until the other demands have been met.

Arnold P. Yerkes, of the Farm Management Department of the Department of Agriculture, who has on file in his office detailed information touching the number of farm tractors now actually owned by operators of farms, expressed the view that the only thing to do at present, aside from increasing the hours per week tractors are operated, is for all actively interested in this proposition to work to the end that the manufacturers of tractors may be able to get sufficient quantities of raw material to enable them to supply, in part at least, the demand for the tractors.

Mr. Yerkes said the introduction of tractors into farm work is not by any means, as many seem to think, confined to the middle western and other western states. He said tractors are now in use to a gratifying extent in the easterly states.

Paige April Profit $105,909.32

DETROIT, June 11—Total assets of the Paige-Detroit Motor Car Co. on April 30 were $4,165,191.22 and the net profit for the month was $105,909.32. During that month sales totaled $1,741,987.59, the number of cars shipped being 1749. Balance sheet of the company as of April 30 follows:

ASSETS

Current:		
Cash on hand and in banks	$787,474.17	
Collection drafts	75,447.79	
Accounts receivable	417,076.52	
Inventories	$2,518,589.24	
Less depreciation	13,041.33	
	2,505,547.91	
Total current		$3,785,546.39
Investment:		
Bonds (municipal)		50,000.00
Fixed:		
Plant account	$469,638.83	
Less depreciation	187,853.92	
Total		281,784.91
Deferred Charges:		
Prepaid expenses		47,859.92
Total assets		$4,165,191.22

LIABILITIES AND NET WORTH

Current:		
Accounts payable	$1,062,254.66	
Accrued pay roll	47,864.86	
Dividend "common"	45,000.00	
Accrued expenses	27,895.95	
Total current		$1,183,015.47
Deferred Charges:		
Reserve preferred stock dividend	$46,672.53	
Reserve for guarantee	27,927.69	
Total		74,600.22
Total liabilities		$1,257,615.69
Net Worth:		
Capital stock, common	$1,500,000.00	
Capital stock, preferred	999,950.00	
Surplus stock	407,625.53	
Total net worth		2,907,575.53
Total liabilities and net worth		$4,165,191.22

Sales for April, $1,741,987.59.
Net profit for April, $105,909.32.
Cars shipped in April, 1,749.

Accessory Makers Consult War Dept.

WASHINGTON, June 14—Over 100 parts and accessory makers manufacturers are here to consult with the War Department to-day, to-morrow and Saturday, in regard to the exact interpretation of specifications for class A and B army trucks, with which they will have to comply in supplying parts and accessories for these vehicles.

Savage Arms Corp. in Industry

NEW YORK, June 11—The Savage Arms Corp., formerly the Driggs-Seabury Ordnance Co., Sharon, Pa., will continue to play a prominent part in the automobile industry. The company will continue to furnish forgings, axles, frames, gearsets and other parts, and is laying plans for a greatly increased business. As stated in THE AUTOMOBILE last week, the Driggs-Seabury Co. has acquired all property and assets of the Savage Arms Co., Utica, N. Y., and has adopted that name.

Hardwood Supply Is Depleted

Automobile, Truck and Body Makers Demand Quantities, but Deliveries Handicapped

ST. LOUIS, MO., June 11—Hardwood dealers here, who have in the past supplied much of the lumber for automobile manufacturers, are overwhelmed at present with inquiries. Dealers say the supply available for immediate shipping is unequal to the demand. They hope for relief from the recent order of the Interstate Commerce Commission ordering 13,000 freight cars into Southern service, that number to be maintained by exchange of an empty for a loaded car.

Two-inch maple, which early in 1916 was quoted for Detroit delivery for $26 per 1000 ft., was sold at $32 the first of the year, recently was quoted at $35, and advance quotations are given at $40.

First and second 2-in. ash, formerly used as the chief lumber for body building, is quoted at $90 per 1000 ft. in Detroit. Very little is obtainable.

Gum was sold as low as $24 for 2-in. stock 2 years ago. It is being priced on future deliveries at $41 and there is very little stock.

During the last few weeks thick oak, used chiefly by truck builders, has advanced readily.

Pierce-Arrow Declares Dividends

NEW YORK, June 13—Quarterly dividends of 2 per cent on the preferred and $1.25 a share on the common stock of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., have been declared. The preferred dividend is payable July 2 to stock of record June 15 and that on the common Aug. 1 to stock of record July 14.

Must Boost Oil Production

WASHINGTON, June 13—Francis S. Peabody, chairman of the fuel committee of the Council of National Defense, told the Senate public lands committee to-day that the United States is not producing enough oil to win the war. "New wells must be developed," he said, "or the reserve supply will be exhausted in 12 months and production will be 50,000,000 bbl. short of requirements."

Only One Company Increases Tire Prices

NEW YORK, June 11—Despite rumors to the effect that tire prices would quite generally be increased this week, such increases have not materialized. The rubber situation is no more acute than during the past few months, and though the supply on hand is sufficient for immediate demands, stocks at the factories are not as great as tire manufacturers would like. Shipping conditions have caused some apprehension, though, it is pointed out by the Rubber Assn. of America, that no rubber ships have been

sunk as yet. Plenty of rubber is coming in. The cotton situation is somewhat easier, following the receipt of a shipment of Egyptian cotton this week. Prices are high, however, and American cotton, too, has touched new high levels.

The Lee Tire & Rubber Co., Conshohocken, is the only one which has made a recent change. This company adopted a new list June 1, as follows:

Size	Old Price Plain Tread	Old Price Red Tube	New Price Plain Tread	New Price Red Tube
30 x 3	$13.20	$3.75	$15.25	$4.25
33 x 4	27.50	6.20	31.30	7.20
34 x 4	28.50	6.45	32.30	7.40
35 x 4½	39.70	8.20	38.25	8.95
36 x 4	30.35	6.70	34.40	7.80
36 x 4½	40.20	8.45	39.50	9.20
37 x 5	47.60	9.65	48.10	10.75

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Staver Appointed Receiver for Drexel

CHICAGO, June 12—Harry B. Staver, president of the Staver Carriage Co., was appointed receiver for the Drexel Motor Car Corp. yesterday by Federal Judge Carpenter. The court was advised that a $12,000 reorganization fund has been raised. Thomas J. McFarland and Mark P. Bransfield, heavy investors in the company, have indicated their willingness to turn over $500,000 worth of real estate to square up their debts to the company.

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B. & L. Lamp Company Petitioned

NEW YORK, June 11—A petition in bankruptcy has been filed against the B. & L. Auto Lamp Co., manufacturer of automobile lamps. Liabilities are said to be $40,000 and assets $15,000. The company was incorporated Nov. 4, 1909, with a capital of $15,000. A reorganization is planned.

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DETROIT, June 11—The Detroit Starter Co. has increased its capital stock from $150,000 to $200,000.

Further Declines in Securities

Few Gains in Inactive Market —G. M. Chalmers and Chevrolet Issues Higher

NEW YORK, June 12—Comparatively little activity has characterized the automobile securities markets during the past week and most of the stocks show a decline, what gains were recorded being largely fractional. General Motors, Chalmers and Chevrolet issues were the center of the most active speculation of the group, the former making a rise of 4¼ points on the common and of half a point on the preferred, and Chevrolet and Chalmers each netting a 3-point advance.

Portage Rubber common went up 2 points, as did Willys-Overland preferred, the other gains recorded being merely slight fluctuations. The most noticeable declines were in Saxon, which dropped 11 points; Miller Rubber common, which lost 5, and the preferred of the same company, which dropped 2 points.

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Higrade Completes Organization Details

GRAND RAPIDS, MICH., June 11—The Higrade Motors Co., organization of which was announced in a previous issue of THE AUTOMOBILE, will sell $115,000 worth of stock still in its treasury at $10 per share, which is the par value. The company is incorporated under the laws of the State of Maine for $250,000, all common stock with a par value of $10 per share. Approximately $135,000 has already been subscribed for. The Higrade truck is over 1500 lb. capacity, and it is expected will be the highest priced truck on the market. The price has not yet been announced.

The Higrade company will complete the first of its series of fifty trucks for delivery by Aug. 1. Contracts for its 800 trucks to be delivered in monthly series during the next year are already on hand.

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DIVIDENDS DECLARED

Stromberg Carburetor Co., quarterly of 75 cents a share, payable July 2 to stock of record June 15.

Stutz Motor Car Co., $1.25 a share, payable July 2 to stock of record June 27.

Yale & Towne Mfg. Co., quarterly of 2½ per cent payable July 2 to stock of record June 22.

Willys-Overland Co., quarterly of 1¾ per cent on preferred, payable July 1 to stock of record June 20.

Reo Motor Car Co. quarterly of 2½ per cent, payable July 2 to stock of record June 15.

Motor Products Corp., quarterly of $1 a share payable July 1 to stock of record June 20.

White Motor Co. quarterly of $1 a share payable July 1 to stock of record June 16.

Kelly-Springfield Tire Co., quarterly of $1.50 a share on preferred, payable July 2 to stock of record June 18.

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TOLEDO, June 13—The Tillotson Carburetor Co. is moving into new quarters. It will employ 500 men and will turn out 2000 carbureters daily, Willys-Overland taking the major part.

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TOLEDO, June 13—The Willys-Overland Co. will hold a convention of star retail salesmen in September. A contest of sales will decide the delegates. Election to the Congress will be decided by votes which will be points for each car sold.

Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co	68½	71¾	..
*J. I. Case T. M. Co. pfd	..	85	..
Chalmers Motor Co. com	10	15	+3
Chalmers Motor Co. pfd	..	..	..
*Chandler Motor Car Co	89	90	— ½
Chevrolet Motor Co	98	100	+3
Fisher Body Corp. com	35	35½	+1
Fisher Body Corp. pfd	87½	88½	— ½
Fisk Rubber Co. com	78	80	..
Fisk Rubber Co. 1st pfd	103	106	..
Fisk Rubber Co. 2d pfd	92	95	..
Firestone Tire & Rubber Co. com	125	127	..
Firestone Tire & Rubber Co. pfd	106	108	..
*General Motors Co. com	108½	109	+4¼
*General Motors Co. pfd	88	89	+ ½
*B. F. Goodrich Co. com	52⅜	52¾	..
*B. F. Goodrich Co. pfd	107½	108⅛	— ⅛
Goodyear Tire & Rubber Co. com	193	197	—7
Goodyear Tire & Rubber Co. pfd	106	108	..
Grant Motor Car Corp	3	5	..
Hupp Motor Car Corp. com	3	4	..
Hupp Motor Car Corp. pfd	72	80	..
International Motor Co. com	5	10	—1
International Motor Co. 1st pfd	30	50	—5
International Motor Co. 2d pfd	10	20	..
*Kelly-Springfield Tire Co. com	49½	51	—1½
*Kelly-Springfield Tire Co. 1st pfd	88	93	+1
*Lee Rubber & Tire Corp	18	19	— ¾
*Maxwell Motor Co., Inc., com	48¼	49	—1½
*Maxwell Motor Co., Inc., 1st pfd	65	65¾	—1¾
*Maxwell Motor Co., Inc., 2d pfd	31	32	— ½
Miller Rubber Co. com	190	198	—10
Miller Rubber Co. pfd	102	105	—2
Packard Motor Car Co. com	..	151	..
Packard Motor Car Co. pfd	95	98	—1
Paige-Detroit Motor Car Co	29	31	..
Peerless Truck & Motor Corp	15	18	..
Portage Rubber Co. com	152	158	+2
Portage Rubber Co. pfd	..	..	..
Regal Motor Car Co. pfd	..	22	..
Reo Motor Car Co	28	30	—1
*Saxon Motor Car Corp	41½	43	—11
Springfield Body Corp. com	52	57	..
Springfield Body Corp. pfd	110	117	..
Standard Motor Construction Co	12	13	— ½
*Stewart-Warner Speed. Corp	74	76	+1
*Studebaker Corp. com	81¾	82	..
*Studebaker Corp. pfd	101	105	..
Swinehart Tire & Rubber Co	65	70	..
United Motors Corp	27½	27¾	—1¾
*U. S. Rubber Co. com	61¼	62¾	+ ⅜
*U. S. Rubber Co. pfd	106	108	+ ½
*White Motor Co	46¼	47¼	+ ¼
*Willys-Overland Co. com	28¾	29	+ ¼
*Willys-Overland Co. pfd	92½	95	+2

*At close June 11, 1917. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Change
Auto Body Co	..	29	..
Bower Roller Bearing Co	36½	39	+1¾
Chevrolet Motor Co	..	..	..
Commerce Motor Car Co	..	..	..
Continental Motor Co. com	7⅜	7⅞	..
Continental Motor Co. pfd	..	..	..
Edmunds & Jones com	..	..	..
Ford Motor Co. of Canada	..	235	..
Hall Lamp Co	..	24	..
Hayes Mfg. Co	..	..	..
Michigan Stamping Co. com	..	..	..
Motor Products	..	..	..
Packard Motor Car Co. com	..	150	..
Packard Motor Car Co. pfd	..	96	..
Paige-Detroit Motor Car Co	30½	31½	+ ¾
Prudden Wheel Co	..	25½	..
Reo Motor Car Co	29½	30	+ ¼

INACTIVE STOCKS

Atlas Drop Forge	38	41	..
Kelsey Wheel Co	..	40	..
Regal Motor Car Co	..	26½	..

THE AUTOMOBILE

PUBLISHED WEEKLY

Vol. XXXVI Thursday, June 14, 1917 No. 24

THE CLASS JOURNAL COMPANY
Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
231-241 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay A. Ludlow Clayden
Sydney Oxberry P. M. Heldt
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BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—95 Fort Street, West, Phone Main 1351
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Cable Address - - - - - Autoland, New York
Long Distance Telephone - - - - - 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico - - - - - One Year, $3.00
Canada - - - - - One Year, 5.00
Foreign Countries - - - - - One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Using the Right Men

WHEN the United States declared war THE AUTOMOBILE in discussing the situation expressed the hope that the government would make full use of the knowledge and ability of the leading men of the industry. The events and the appointments of the past few weeks show that the right men are indeed being put in the right places, that the services so freely offered are being accepted in Washington in the proper spirit.

This is a fine beginning and it is apparent that these men are not going to be bound hand and foot with red tape, that their work is not going to be wasted or frittered away by superior officers of the petty permanent official type.

Let the good work go on. There are many more willing and able brains in the automotive industry which can be spared for government service.

Future Engines

THE paper read by Louis Coatalen before the British Aeronautical Society, of which the first part is reproduced in this issue of THE AUTOMOBILE, is an important contribution to the rather meager literature of the subject. Few engineers have had such opportunities for experiment and few as great success in the production of engines of high efficiency. Coatalen's views are entitled to receive the very greatest respect.

The paper is a long one and some of its most interesting portions are toward the end. Briefly, however, Coatalen seems to consider that the racing car and automobile engines have ceased to have any influence on aviation engine design; that in the future it is the latter which will influence the former.

On the question of aluminum alloy his opinions are most pronounced. The aluminum cylinder he looks to see practically universal for aircraft engines and for automobiles as well. The aluminum alloy piston he considers a complete success and recognized as such by European engineers.

He shows how racing-car experience led to the oil-cooling system used in the Sunbeam aircraft engines, and states the belief that oil temperature is one of the greatest determining factors in the durability of an engine. The principle he employs is to keep the crankcase empty of oil by an exhausting pump, removing the oil to the cooler immediately it leaves the bearings.

On cooling, while pinning his faith to water for the present he expressed the liveliest interest in air cooling. Here he suggests that the aluminum alloy cylinder may play an important part, and permit still more weight to be saved. He states that the best water-cooled engines have now been cut to well under 3-lb. per horsepower as against between 4 and 5 lb. before the war. The reduction has been in the order of 40 per cent.

The difficulty of finding a ready means of comparing the quality of one engine with another forms the subject of a part of the paper, and Coatalen says the European practice among engineers now is to think in terms of brake mean effective pressure. This is not ideal because it is incomplete, but it is still more confusing because to find it requires calculation. As an alternative Coatalen suggests that the rating of an engine be stated as the power developed per unit of displacement at an agreed crankshaft speed.

Meeting Truck Requirements

THE opening of bids for motor trucks for the Army has shown that the new specifications of the War Office are not so unpopular as previous rumors indicated. Practically one-third of the old-line truck makers have submitted bids exclusively for the War Office trucks.

A closer analysis of the specifications by manufacturers shows that the difficulties of meeting the War Office requirements are not so great as many had believed. The Quartermaster's Department showed good judgment in opening bids for standard trucks as well as War Office specifications.

The assuring factor in the truck bids is that our makers classed as production manufacturers can give 100,000 trucks if necessary within the year. With scarcely over 42,000 of these needed for the army of 1,000,000 men, there remains a good quota for industrial sales, a number perhaps as great as the industries will demand. There will be no shortage of trucks in the Army or in industries, provided nothing unexpected develops in the materials situation.

Co-ordination of Labor a Prime Factor in War

To Avoid Dislocation of Industry, Changes Must Be Accomplished Gradually and in Consultation with Labor's Representatives and Managers of Industries

Suggests Releasing Factory Workers To Assist in Harvesting Crops

By William B. Wilson
Secretary of Labor

¶ EDITOR'S NOTE—*In his speech before the Editorial Conference of Business Papers in Washington, Secretary of Labor Wilson contrasted warfare as carried on to-day with that of ancient times and emphasized the important part played by labor, pointing out that the business of war calls for reorganization and co-ordination of all industries and cautioning against arbitrary changes of industrial standards.*

OUR country is facing—in fact, going through—the greatest crisis that has ever confronted it. My observation has been that possibly 90 or 95 per cent of our people are thoroughly in sympathy with the course that has been pursued in our international affairs, but I doubt if there is 10 per cent of our people who realize the tremendous task that is before us.

Modern warfare is entirely different from that of ancient times. Formerly an army might be an army of invasion, and live almost entirely upon the country through which it was passing, with a comparatively small number of people furnishing the necessary munitions for its sustenance and support. That has all been changed, and under warfare as it is now conducted more people are required in the industries in the rear for the support of an army than are required in the trenches at the front.

Country Developed by Pioneer Spirit

Our country has been built up almost entirely upon the pioneer spirit, and the pioneer spirit is conducive to the development of individualism. It is only in a moderate way that we have been able to co-ordinate and organize our industries. They have not been organized in the manner that is necessary to meet the emergency we are now facing. One of our great problems will be the problem of mobility, the changing rapidly from one line of industry to another line of industry, as the emergencies may require the change. That means also the mobility of labor, because you cannot transfer your activities from one line of industry to another line of industry without transferring your workers from the one line to the other. It means also the utilizing of one kind of skill that is akin to another kind of skill, rather than the same kind of skill, and when you undertake that in our industry it means friction among the workers themselves. In their efforts to protect themselves in their respective trades, to maintain the highest possible standard of wages and the best conditions obtainable, they have set up certain standards, certain limitations, certain regulations that they insist upon being complied with.

Industrial Changes

To meet our emergency now will require the removal of a great many of those standards, limitations, and regulations. They cannot be removed arbitrarily; our people still have that individual spirit which would resent the attempt on your part, the attempt on the part of the Government to crush down their throats any of these changes. When the changes are made, as they must eventually be made, they will have to be made in consultation with not only those who are the managers of industry, but those who are the representatives of the workers; and it is at that point that the Department of Labor of the United States Government and the various State departments of labor can be of service. One of the functions that has devolved upon the Department of Labor, one of the things it was created to do, was to negotiate disputes arising between employers and employees, in order that industrial peace might be maintained. There is need for a governmental agency of that kind in times of peace; there is a greater need for it in times of war, when every energy we possess must be conserved and utilized to its utmost, in order to secure the standard of efficiency necessary for the protection of our institutions.

It has been the policy of the Department of Labor, and, I think, the policy of the various State departments having similar authority, not to endeavor to impose its viewpoint upon either the

workers or the managements in any trade dispute that may arise, but rather to find some common ground that will be mutually acceptable, even though it may not be mutually satisfactory. In other words, the work of mediation is not a judicial work; it is not a judicial function; it is not to hear both sides and then determine the rights and the wrongs of the situation, and to pass and enforce its decision. The work is diplomatic rather than judicial, and it is in that spirit that we must approach the problem of the mobilizing of labor in the present crisis through which we are passing. We must approach it from the standpoint of diplomacy rather than from the standpoint of judicial decisions.

As an illustration, I may say that I have just returned from central Pennsylvania, where we had a convention representing all of the coal miners of that great bituminous coal field. It is one of the coal fields upon which the industries of New England, New York, New Jersey, and Pennsylvania are dependent for their supply of fuel to conduct their operations. One day's shutdown of that field alone would have meant millions of dollars of loss to the industries of our country. Coal had already gone skyward—spot coal—because of a shortage of transportation facilities. To have added to that a stoppage of work in the central Pennsylvania coal fields would have sent the coal prices still higher than they have been during the past winter and spring. The miners were in an ugly mood.

Living Cost Affects Wage Contract

I found that when I met their representatives in convention, and they were somewhat justified in their position. It is true they had lost sight of the fact that they were under contract to work at 75 cents per ton for the mining of coal until the 31st day of next March. They failed to realize the obligation they were under, but they had been face to face with a difficult problem, the first part of which was that the cost of living, of some of the articles of food ordinarily used in a working man's family, had gone to almost prohibitive prices. That had been true of flour, true of potatoes, of cabbage, of onions, of beans, and rice, hominy following in the wake, and because of those tremendously high prices that had risen from the time that they had made the contract their standard of living had been reduced; but even that had not made them particularly uneasy, until the condition arrived when those coal operators who had coal loose, available to put upon the open market, aside from their usual annual contracts, were able to compel the consumer to pay $4.50, $5, $5.50, and $6 a ton for coal that the miner knew could be produced and put on the car at from $1.50 to $1.75 a ton; and with the high cost of living on the one side and the fancy prices obtained for spot coal upon the other, a condition was created that placed the miner in a frame of mind where he cared nothing whatever for his contract, and insisted simply upon securing a tremendous increase in his wages, to meet the increased cost of living.

Now, most of the coal districts had settled upon a basis of 20 per cent increase, voluntarily granted by the operators without any threat of a suspension of work, but by virtue of and in recognition on the part of coal operators that the increased cost of living warranted the granting of an increased rate, and that that was to be met by the increased rate which they, in turn, had received for their coal. For central Pennsylvania miners to have insisted upon a 33 per cent increase—which they were insisting upon—with the others having accepted a 20 per cent increase, would have meant that just as soon as the central Pennsylvania coal operators conceded 33 per cent increase in the mining rate, a disturbing factor would have been injected into every other coal field in the country, and the supply of coal, which is already short, would have been made shorter by the disturbance growing out of the condition thus created. Realizing the importance of it, the Department of Labor, at the suggestion of the State Department of Labor in the State of Pennsylvania, proceeded to endeavor to negotiate an adjustment, negotiated a tentative agreement here in the city of Washington, subject to ratification by the miners in convention that met day before yesterday. As I said, the miners were in an ugly mood, and if we had undertaken to force down their throats an agreement proposing an increase of from 20 to 25 per cent, when they were demanding 33 per cent, we would not have succeeded. The situation had to be dealt with in an entirely different way, and we proceeded to appeal first to their honor—that they were under obligations to continue under the old contract; second, to their patriotism, and third to their spirit of fair play to all of the rest of the country; and by appealing to those we were able to secure an adjustment of that difficulty and to keep the wheels of industry rolling in our eastern plants.

Finding Employment for Workers

It will also be necessary for us to utilize the agencies we have in our power or in our possession for the purpose of finding employment or finding workers rather from one line of industry, less important, for another line of industry more important. As an example of that the Shipping Board is undertaking to build wooden vessels—the first time that it has been undertaken on a large, comprehensive scale since the coming of the steel vessel into operation in our ocean-going trade. The shipbuilding industry had practically died out of existence on our seaboards. The question arose as to where the working people were to be obtained to do the work of building wooden ships, and that work naturally devolved upon the Department of Labor. Our agencies were set in motion for the purpose of registering all of the shipwrights that could be obtained in the United States, who might be used as educators or trainers of other woodworkers who needed the additional knowledge known in shipbuilding, in order to make them shipwrights. We succeeded, in a period of some three or four days, in registering 20,000 shipwrights, to be used as a nucleus of that organization. Most people had overlooked the fact that we were still building

wooden ships along our rivers, and, to a small extent, on our coasts, and when we came to scour the country we found that we could get the nucleus of an organization.

Supplying Farm Labor

One of our difficulties in the present situation will be the finding of farm labor to meet the peak of the load when the harvest time comes. In the greater portion of the eastern part of our country our farming is mixed, and, by virtue of the fact that it is mixed farming, the farmer can very generally take care at harvest time of all of the crops he is able to prepare for in the spring, because the harvesting comes at different periods, just as his planting comes at different periods. But there are certain parts of our country where they have specialized, where they do not engage in mixed farming, such as the cotton plantations of the South, the great wheat belt of the Middle West, and some of the fruit growing districts of the Pacific Coast.

During the past three years we have endeavored to supply that labor, and we have found it generally in the floating labor of the country. That floating labor, through advertisements carried in the post offices, in newspapers, and by other processes, was directed into the harvest fields when the harvest commenced, beginning with Missouri, Kansas, Oklahoma, and moving northward from there. That floating labor is scarcely available for this year's harvest, and we must proceed to a different line of action in order to secure the harvesting of the grain that is so essential for our own support during the period of contest.

An experience of mine a great many years ago recurred to me, and we propose, with the assistance that we can get from the State labor organizations and agricultural organizations, the employers and workers in the industries, to carry it into effect. In 1885 I was mining iron away up in the little village of Clinton, in the State of New York, in the Mohawk Valley. At that time the Mohawk Valley had specialized in hop growing; it was the center of the hop growing industry of the United States. To my surprise, when the hop picking season came, every industry in the neighborhood shut down; the mines were closed, the furnace was shut down, the little factories and shops throughout the valley discontinued their operations; they had made their arrangements for the annual repairs and replacements to take place at that time, and they retained a sufficient number of workers to go through with their usual annual repairs and replacements, and the balance picked up bodily, men, women and children, and went out into the hop fields and made a holiday of picking hops.

Question of Wages Unimportant

The question of wages was unimportant to them, because they were not dependent upon hop picking for their livelihood. They were dependent upon other pursuits. The wages in other pursuits might be important, might be primary, but the wages in hop picking were but secondary. They picked the hops, and the value of the proposition was that after they had picked the hops they had other employment to come back to. And we hope this year to make a nation-wide drive on the same principle —the old barn-raising idea, the neighborly thought, getting our industries in the wheat belt, in the cotton belt, in the big fruit belts, to make their arrangements for the annual repairs and replacements during the harvest period, and then get our workmen into that barn-raising frame of mind, to go out in a neighborly way, for their own welfare and the welfare of the Republic, the welfare of the farmer as well as the welfare of the rest of us, to go out into the harvest fields and gather the harvest, and get every grain that is available, and then have a job that they can go back to after the harvest has been made. And that is one of the things that you gentlemen can be of great value to us in carrying into practical operation.

Labor Department to Co-ordinate Work

I have selected Col. G. L. Spangler of Pennsylvania, a large coal operator in that State, and a banker and business man generally, who has volunteered his services—I have selected him to undertake the organizing of a drive of that kind, and I fully trust and believe that it will be successful in solving the problem. The Department of Labor does not seek in any of these activities to supersede the activities of the State departments of labor or of the State departments of agriculture. There is work enough for all. We are eager to have the State departments organized to the fullest extent that they can organize, and we, as a Federal department, will not undertake to supersede them; we will simply undertake, to the best of our ability, to supplement the work that they are doing, and to extend it and connect it and co-ordinate it beyond State lines, where they have not the power and authority to go.

American Automobile Assn. Urged To Organize Touring Car Units

THE American Automobile Association has 102,600 members, all of whom will be urged to organize into company units of twenty-seven five-passenger or seven-passenger touring cars, two high-speed roadsters, one light truck and forty men. The companies will be commanded by a carmaster, picked from the ranks, who will have a rating of sergeant of the first class; three assistant carmasters with rank of sergeant; one machinist, with rank of sergeant; one helper, with rank of corporal; one watchman, ranked as private of the first class; one trumpeter messenger, also rated as private of first class; one cook, and twenty-eight drivers, with rank as sergeants. Five additional officers will be required for the battalion units. The commander will have the rank of major. As fast as the State and club organizations fill up their company units they will report to the headquarters of the American Automobile Association at Washington, which in turn will report to the government. This plan was arranged by John A. Wilson, a cousin of President Wilson, and president of the organization's preparedness committee. Mr. Wilson does not know when these reserve transport units will be desired, but he urges that these units be organized immediately.

Farm Tractor Design—IV

Must Overcome Transmission Inefficiency

This is the last of a series of articles dealing with the problems to be overcome in producing the vast quantity of tractors essential for increasing the world's food supply. The first article pointed out that a big market awaits a good tractor, that the engine is the principal unit, and that it is not possible to set a definite price limit. The second dealt with engine problems and how heavy fuel will affect design in the future. The third was a consideration of the different layouts of wheels and other forms of drive.

By A. Ludlow Clayden

1—Advantages in high speed for tractors.
2—Transmission wastes 40 per cent power.
3—Smaller gear reduction in track-layer.
4—Stock parts may retard progress.
5—Workmanship must be maintained.

IF there is to-day such a thing as an average transmission system for tractors it would be composed of a clutch, a two-speed and reverse sliding gear, a bevel gear and differential, and an exposed gear drive on the rear wheels, a bull-ring gear as it is commonly called. There is evidence in the drafting rooms of several tractor factories just now that efforts are being made to inclose the ring gear, but it is an extremely difficult job, so difficult to do efficiently that it may be questioned whether it is worth while.

Alternatively there is the possibility of driving the wheels through the axles, automobile fashion, this necessitating an extra train of gears within the transmission, and such gears will have to support a heavy tooth load. Yet again there is the worm gear to be considered, and the planetary gear, which can be constructed to give a great speed reduction.

While it is not at present a popular form of drive, there is a great deal to be said in favor of the worm gear. The aim is to waste as little power as possible between the engine and the wheels, and usually about 40 per cent vanishes in the transmission. A worm gear can be made the most efficient gear reducer if the circumstances of its use are satisfactory and if the reduction required is large, but it does not follow that the worm drive should be the final drive.

Possibilities of Worm Gear

Worm-gear efficiency, despite the frequent publications of the protagonists of the Lanchester and straight types, is still largely wrapped in mystery; but one fact seems to stand out very clearly, which is that efficiency is greatest when the rubbing speed of the worm is fairly high. Thus, if a worm with a ten-to-one reduction is about the largest that can be accommodated in the machine, it might conceivably be better placed at the engine end of the transmission than at the axle end. A possible layout would be to have the worm wheel and two sliding spur gears on one shaft mounted in an extension of the axle case; other gears on the differential cage could be meshed with the sliding ones to give the two speeds. Everything would thus come in a common oil bath, just as it does in the case of existing machines with the transmission and worm or bevel gear combined, but the opposite way around.

Probably time will show that the exposed ring gear is the most practical way of getting enough reduction for large-wheeled tractors and that the fully inclosed drive is best for the smaller machines, where the smaller wheel permits a less intense reduction in the transmission.

A very important point enters here, which is that the high-speed tractor ought to be more efficient than the slow-moving one. Suppose, for example, we have an engine which is powerful enough to pull two plows at four miles, or four plows at two miles an hour. Obviously, the gear reduction necessary to run at the higher speed will be just half that required for the slow speed, if the engine runs at a constant rate. While a twenty-five-to-one reduction is not twice as efficient as a fifty-to one, it is, other things being equal, an appreciable per cent more efficient.

Disadvantage of High-Speed Machine

Now, against this argument there is the fact that the high-speed machine, pulling half the number of bottoms, will have to drive itself twice as far for a given amount of acreage plowed, and, as driving itself absorbs power, we may easily be worse off in the final analysis.

There is, however, another and a better way of looking at the problem. We assume a constant engine speed in either case, and a constant power output from the engine. This means that the quantity of fuel consumed will be so much per hour whatever the speed. Pulling two bottoms at four miles, or four at two miles, will give practically the same total time per acre plowed, and if the higher speed is 5 per cent more efficient there should be a gain.

The most important point really is that we do not yet know anything worth mentioning about plowing speeds for best efficiency, from the viewpoint of the plow, and the quality of the plowing. The horse, with its fixed speed, unvaried for centuries, has prevented experiment in this direction. Now that this limitation is removed much may be discovered.

In this respect the tracklaying type of tractor certainly scores, because the small wheels that are used with a

chain tread do not require much gear reduction. Suppose, for example, we want three miles an hour at 1000 revolutions of the engine; that the wheel diameter is 48 in. in one case. Then the reduction necessary will be forty-seven to one. With a tracklayer the wheel might be half the size, or even less. If it were 18 in., then the reduction needed in the transmission would be only eighteen to one.

Amount of Power Absorbed Is Debatable

Of course, it is debatable what amount of power is absorbed by the track, but there is reason to believe that this is less than would be imagined, while the power absorbed by a large wheel in picking up lumps of dirt and cutting its way along is probably more than might be expected. On points like this we need more information, we need scientifically conducted tests; the trial and error method now being used is a costly way of settling engineering questions. Practically the only conclusive way to discover relative advantages of wheel and caterpillar would be to make two machines as nearly identical as possible except for form of drive. One might, for example, take a tracklayer such as the Cleveland 20-hp. machine and substitute rear wheels with a bull-ring drive for the tracks and sprockets. Of course, just a single pair of machines would not suffice to more than indicate the comparative efficiencies; one would need a few score to reach a final conclusion.

Apart from gear drives of all sorts there are others to be considered, but it seems improbable, at least at present, that either electric or hydraulic transmission is likely to be adopted for tractor work. Electric drive might be applied to a very large machine, but if it were there would not be much object in hauling about the engine and generator. Rather would it seem better to deposit the power plant at a fixed spot and let the tractor be merely a motor on wheels, connected to the generator by cable.

Hydraulic drive is the more promising of the two, but the writer is not aware of any system of hydraulic gearing devised to give a large reduction. All those developed for motor-truck use have a high-gear position where the hydraulic apparatus is inoperative, and if a hydraulic gear is to do successful tractor work it should provide a permanent twenty to sixty to one reduction. There is opportunity here for inventors to show what they can do. If the efficiency of gearing can be improved substantially a direct saving in fuel would result, and this is worth even an increased first cost.

A Chance for Steam

Yet another opportunity, still to be tried, is the application of a high-pressure, oil-fired steam plant; such a plant as is used in the Stanley or Doble cars. A tractor so equipped would bear but small resemblance to the old-style steam tractor; it would use the heaviest of oil fuels, or even coke. Effective condensation is not impossible, so that the water supply difficulty could be overcome. Of course, this suggestion will raise many a smile, but it is not altogether absurd. The degree of automaticity of the Stanley and Doble cars is little appreciated because there are so few of them and so few people that know anything about them. They are as greatly different from the old steam engine as is the modern gasoline motor from the gas engine of twenty years ago. The Stanley and Doble companies are losing a great chance if they do not try out their systems in tractor form.

However, all these things are for the future. Whatever may be tried, and whatever ought to be tried, the big fact now is that we want the greatest possible number of the best tractors we know how to manufacture. This fact will probably produce a situation which will exercise considerable influence upon tractor design for some time to come.

There is great demand for tractor parts, stock parts which can be assembled readily anywhere. Such parts are coming, and coming soon. In an earlier article it was mentioned specifically that engineers had trusted to truck parts, and found them too light in many instances, cooling fans being mentioned as a specific example. The effect of this was to bring the writer letters showing that special tractor fans can now be bought as stock parts —real tractor fans, and not stiffened truck designs. That some of our leading axle makers are only waiting to be quite sure what to make before they begin production is certain, and any slackening in the passenger-car business will enable the gear companies to follow suit. Thus, before the year is out it is safe to say we shall have several more stock engines, stock axles and stock transmissions. Stock axles will lead to stock hubs, and so to complete wheels.

All this will happen much faster than it did in the automobile field, and the danger is that by following the passenger-car procedure in this matter we may tend to crystallize design too swiftly. Though stock parts are wanted urgently, it is to be hoped that their manufacturers will not invest very large sums in fixtures which cannot be altered except at immense cost. The tractor stock parts business should be entered gently and warily from the engineering and manufacturing viewpoints.

Must Have Best Workmanship

In concluding these notes on tractor design as it is today, and as it appears likely to be in the future, the writer again enters the plea for high-grade material and workmanship. The tractor needs the very best of both far more than the motor truck, far more than the passenger car. It ranks second only to the airplane. The tractor has come because its economy over other methods is making it a necessity. In order to save a few dollars of first cost it is utterly stupid to sacrifice reliability or fuel efficiency. The reduction of weight in proportion to drawbar power and the increase of efficiency in transmission are the two great tasks before engineers. That those engineers be not hampered by strangling price restrictions is enormously important to the whole civilized world, for the *efficiency* of the tractor and the *cost* of food are intimately bound together.

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Men of 21 to 30 Wanted in Flying Corps

THE general impression that the United States has a limitless number of applicants for a commission in the aviator section of the Army is entirely erroneous, according to the War Department. Somehow this impression has gone abroad and been copied by papers throughout the country, thereby discouraging many capable men from putting in applications to become pilots. The War Department states that any man between the ages of 21 and 30 who is physically, mentally and morally qualified for a commission in the aviation section has as good a chance now to become a flyer as at any time. In order to apply for a commission in the aviation section, Signal Corps, a man should write to the aeronautical officer at the nearest department headquarters or to the personnel section, Signal Corps, War Department, Washington, D. C. An application blank will be sent to him, which he should properly fill out. If this application is satisfactory he will be notified to appear before an examining board. Upon passing the physical, mental and moral examinations he will be enlisted and sent to one of the army schools of aeronautics for the eight weeks' course. Upon graduation he will be sent to one of the aviation schools, where, as soon as he has satisfactorily passed the flying tests, his commission may be issued to him.

Factors in Aviation Engine Design

Part I

How Aviation Engine Differs From Other Gasoline Motors—Automobile Engines of Future To Be Modeled Upon Present-Day Aircraft Practice — Supremacy of Aluminum Alloy

By Louis Coatalen
Chief Engineer Sunbeam Motor Car Co., England

EDITOR'S NOTE—*Louis Coatalen is recognized as one of Europe's leading automotive engineers. Born and educated in France, he began his work there, joining Humber, Ltd., of Coventry, about 1905, and producing the first British car with any reasonable high gear performance. Since his association with the Sunbeam company this car has ranked with the best. His racing cars hold many records. The Sunbeam aviation engine has been the principal product of the factory since the second year of the war, and is reckoned among the best of the European airplane motors.*

THAT belief which appears to obtain in some quarters to the effect that the design and production of an aircraft engine is akin to that of a motor-car, one proves, on even casual investigation, to be what the old writers would have styled a vulgar error. By taking a few points which come most obviously to mind we discover at the very outset that the problems involved by the two propositions are fundamentally different.

Car and Plane Engines Contrasted

Consider for a moment the chief characteristics of an internal combustion engine for motor-car service:

1—Weight is practically no object.

2—Cost is of the utmost importance; therefore there must be the minimum of machining, as instance the fact that the connecting rods of a motor-car engine are not milled, nor are the crankshafts machined all over.

3—It must be capable of production in great quantities at minimum cost otherwise, with the least amount of labor.

4—It must be silent to the extreme of what is practicable.

5—The maximum effort of which the engine is capable is not needed to be maintained for long at a spell. It seldom works at full power, and the brief duration of such effort explains the extraordinary reliability of even the inferior types of car engines.

6—Flexibility, giving a constant torque at a crankshaft speed from 300 revolutions a minute to 2000 revolutions a minute.

7—Of course, this is a torque which corresponds to a very low mean effective pressure, namely, 80 lb.

8—The compression is relatively low and the valve area small, the cam forms being easy and the valve springs light.

9—The system of lubrication, wherein the oil is carried in the base-chamber of the crankcase, suffices.

10—The maximum horsepower required to be developed by any one engine rarely approaches 100. In the vast majority of cases it does not exceed 30.

By contrast, the factors governing the design of an aircraft engine may be enumerated thus:

1—Weight is of prime importance.

2—Cost is not the deciding factor provided the necessary amount of power is obtained for the given overall dimensions of the engine, for its weight both as regards material and fuel, water and lubricant consumption; also provided the desired degree of reliability is obtained.

3—The amount of labor necessary to produce a satisfactory aircraft engine of high output is, and will be, always many times what is necessary in the case of a car engine, and is a matter of secondary importance provided the desired results are obtained. No machining is too expensive if it saves weight.

4—Silence is relatively unimportant.

5—The aircraft engine does all its work at practically full power.

6—Flexibility, or evenness of torque, is of secondary importance, because an aircraft engine is required to develop maximum torque at practically one speed only, or, at most, at an extremely narrow range of speed.

7—But at its working range of speeds a very high brake mean effective pressure, say 130 lb., is called for.

8—The compression must be relatively high and the valve area large, while the valve springs must be stronger than for a motor-car, due to the cam form imposed.

9—The high mean effective pressure necessary, coupled with the fact that the engine does nearly all its work at full power, involves a completely different point of departure in determining details of design and, notably, the exploitation of new methods of achieving lubrication. Experience has demonstrated abundantly that when the base-chamber is used as an oil well, as in motor-car practice, the lubricant soon becomes too hot, therefore too fluid, resulting in reduction of pressure to the main bearings; hence the evolution of the dry sump system for lubricating aircraft engines. Oil viscosity varies greatly with the temperature.

I would mention in passing that the history of the engine dry base lubricating system is neither more nor less than the story of my racing experience on the Brooklands track. In the course of long runs on it years ago it was found that the oil pressure went down more and more the longer each run was continued. Naturally we tried one brand of oil after another with the view to discovering which would retain its viscosity most effectively. Of course, castor oil gave greatly superior results to mineral oils. Even so, however, it soon became plain that the problem was one that could not be solved entirely by the use of a vegetable oil. Indeed, results were quite unsatisfactory, notwithstanding that we greatly increased the effectiveness of the pump employed. Therefore my next step was to use the same pump to force the oil out of the base-chamber through two 1-in. copper pipes arranged round the car. We returned the oil direct from that process of cooling to the service of the bearings under pressure. This proved a great advance as regards maintaining pressure; but the scheme involved all the inconvenience of a long circuit for the oil in connection with which all the cooling was achieved under pressure, because the oil passed quite round the car before being returned to the bearings.

Two Oil Pumps Used

Therefore the next stage was to employ two pumps. One forced the oil out of the base-chamber through a cooler, from which it passed into a tank placed at the back of the car. In this tank the oil was not under pressure of the pump, for the tank itself was merely under atmospheric pressure. In practice it was found that this was really a notable improvement. Thus the bulk of the oil was kept all the time in the tank, which itself was in a draft while the car was traveling, while the base-chamber itself was kept quite empty. From the tank the oil passed to the pump, and was so forced

by it into the bearings. Therefore the oil was under pressure only for a short distance, namely, from the pump to the bearings, because, as has been explained already, the tank itself was under atmospheric pressure.

Only when we had arrived at this stage was it found that racing cars with engines of high output could be run for more or less indefinite periods without the temperature of the lubricating oil attaining more than 66 deg. C., at which warmth a very good working viscosity was retained.

10—Lastly, in contrasting the standard car engine, the racing car engine, and the aircraft engine propositions under the headings that have been selected for the sake of illustration, it is well to note that the total amount of power required to be developed by practically all aircraft engines today is about 100 hp. minimum, while the maximum totals several hundred per unit.

Aircraft Engine in Class by Itself

It will be seen from those ten points of contrast which, doubtless, might be increased in number, that the aircraft engine of to-day is not akin to the standard motor-car one. Admittedly, the twain are collaterals, both deriving from a common stock, the four-stroke cycle, gasoline internal combustion engine. For the rest, the aircraft engine of to-day is, perhaps, as little like the standard motor-car one as that resembles the variety used on a commercial motor vehicle or that installed in a motor-boat. In fine, it may be said that as the stationary gas engine resembles the portable variety to that meagre degree, and scarcely more, does the motor-car engine resemble the aircraft type. It cannot be proved that the aircraft engine has been developed from the touring car variety. On the contrary, it can be demonstrated abundantly that the aircraft engine is quite a distinct branch of the development of the internal combustion engine. Hence many firms that have been strikingly successful in producing car engines for either touring or commercial use have experienced great and, in some cases, unsurmounted difficulty when called upon to change over to the manufacture of power plant for aircraft. The differences apparent in the design become even more pronounced when they are translated into manufacturing problems in the shops.

On the other hand, we may not lose sight of the likelihood that the very rapid evolution of the aircraft engine during this war, and the extraordinary manufacturing experience and developments of which that is the outcome, will at some future time exercise a more or less temporary effect on the design and manufacture of engines for car service.

Be this as may be, in broad terms I am of opinion that the two schools of design, one concerned with each of these problems, will continue to advance for the most part along two distinct lines which will rather become more than less divergent. Hence on the present occasion little further attention need be devoted to standard engine design for car practice. Suffice it to observe that to date the non-technical opinion of the buying public, which opinion is not to be depreciated altogether, has exercised a not inconsiderable and, on occasion, detrimental influence on the designer and manufacturer. It will be observed, incidentally, that the element affects the proposition of aircraft engine design scarcely at all, especially under the conditions which are beginning to govern the industry toward the conclusion of the third year of war.

Analogy of Racing Car Engine

By contrast, there is another type of engine specially built, as distinct from standardized, and which is fitted to a few motor chassis only each year in relation to the total number produced, because it is evolved and employed for racing purposes solely. Admittedly, in the beginnings of the motor industry the racing car of one year became the standard vehicle the succeeding season. With the lapse of time, however, racing became so highly specialized that if the individual competitor was to enjoy any prospect of success during the last four or five years the racing engine had to become a proposition utterly distinct from those standardized for service or ordinary civilian motor vehicle uses. This point is proved by a summary of the main characteristics required of a racing car engine, and which we find are to a considerable extent identical with those needed for an aviation engine. Thus the following facts should be kept in view:

1—Weight is of importance.

2—Cost is unimportant.

3—The amount of labor and the time necessary for production are matters of relative indifference provided the maximum output of power is obtained for a given size of engine. That demand has led manufacturers to employ overhead valves, which are also used in aviation service and which so far have been employed comparatively little in standard car practice, partly on account of the principle not being so quiet in operation as the L-head system. Every part of a racing car engine must be machined. The connecting-rods are milled to the minimum section, and so forth.

4—Silence is of no importance whatever.

5—The racing car engine does all its work at practically full power, but the evenness of its torque has to be extended over very much wider ranges of speed than is needed so far in the case of an aircraft engine. From 1600 to 3400 crankshaft revolutions a minute is called for in the former case, whereas in the latter the normal speed is 2100. The last-named figure chances to be no less than 1300 r.p.m. slower than the capacity of Sunbeam racing car engines. Therefore it will be appreciated that the engine for racing car service is submitted to bigger stresses than the present-day aviation engine; but that this period of high stress in the case of the vehicle variety is much shorter than obtains in that of the aviation type unless, indeed, the car is being run on a track. Even in that event twelve consecutive hours is considered a very long spell, whereas in aircraft service that period of uninterrupted power output is held to be all in the day's work.

Flexibility as a Factor

6—Under the heading of flexibility the engine for your racing car must be more akin to standard car requirements than to those of aircraft service. This characteristic, therefore, works out as a disadvantage to the racing car engine. When employed on dry roads with efficient gears and so forth the starting torque mounts up to a high figure, whereas in the aircraft engine at starting there is no load on the propeller. it increases, roughly, with the cube of the revolutions.

7—The racing car engine resembles the aviation type in that a very high mean effective pressure has to be obtained with both. In some racing car engines it has amounted to 135 lb. per square inch, taken from the brake horsepower developed at the flywheel.

8—As the problem is power for engine weight and volume, and not silence and low cost, great freedom is allowed the racing car engine designer as regards piston clearances, valve timing, compression, largeness of valve area, strength of valve springs, and so forth, the opportunities in this connection approximating much more to aviation than to standard car engine practice.

9—The high mean effective pressure necessary, coupled with the fact that nearly all the work is done at full power, calls for lubrication methods quite distinct from standard car practice, albeit as yet these have rarely approximated to that of aircraft engine practice, though the problems of maintaining pressure in the oil circuit and of keeping the temperature of the lubricant normal are common to racing and aviation engine service.

10—Comparatively large power is needed in the case of all engines for racing cars, the average being anything from 80 to 225 hp., therefore the requirements are much more on a plane with the demands for aircraft service than with those for the touring car, the town carriage, or the utility motor vehicle.

Lastly, outside influence, traceable in the cases of designing the private car engine and the commercial motor vehicle one, is scarcely, if at all, to be detected in those of the racing car engine and of the aircraft variety. The racing car type has been developed with almost amazing rapidity through various stages along the lines of maximum power combined with low, as distinct from minimum, weight, and with the utmost reliability, notably with a view to enabling the machine to be run for long spells without loss of power.

(*To be continued*)

Pg 1187

Straight-Cut Is Future Motor Fuel

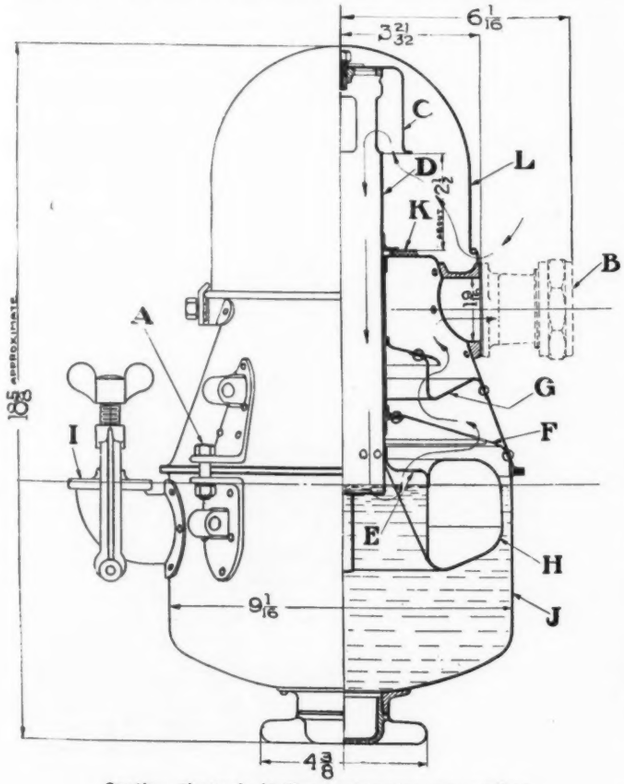
Hastings Suggests Running Crude Distillation to 600-Deg. Boiling Point—Holley Carbureter Air Washer Described

CHICAGO, June 7—The possibility of using for all power purposes where gasoline is now employed a fuel in which gasoline is diluted with kerosene and other lower grade distillates was the chief feature of interest in the discussions arising from the tenth annual convention of the National Gas Engine Assn. at Hotel Sherman yesterday and to-day. Don T. Hastings, chief engineer Holley Bros. Co., Detroit, made the suggestion that the most logical method of utilizing available fuel supplies for automobile and other internal combustion engines was by the use of a "straight-cut fuel." By this is meant permitting the distillation from the crude to run until a product reached a boiling point of perhaps 600 deg. Fahr., thus including present-day gasoline, naphtha, kerosene and so on in the same run instead of cutting at lower boiling points for gasoline and marketing the higher boiling point products separately as kerosene, etc.

This proposition was favorably discussed by many of the gas engineers present, particularly by President Bement. It is impossible, however, to get an expression of opinion from the oil man on the subject. Hastings' suggestion came about in the discussion of his paper on the Holley vaporizing system for the use of heavy liquid fuels in which he described the Holley vaporizers now in service on Ford cars and Ford tractors in England, and which will be on the market shortly in America for Ford products and also in other sizes for cars of other make. This vaporizer was described in THE AUTOMOBILE for May 3.

Hastings also described the construction and operation of the Holley air washer, which has been developed to remove dust from the air on tractors and military trucks.

The Holley air washer was developed in response to the demand for an efficient means of removing dust suspended in the air in the fields or on the road. It consists essentially of a tank containing a quantity of water through which the air entering the engine cylinders is forced to pass. In detail the washer consists of a tank *J* carrying the water, above which is supported by a suitable float *H* the tube *D* through which the air enters the washer. The lower end of this tube dips beneath the surface of the water about ¼ in., this depth of immersion being maintained by the float as the water is exhausted from the air washer. Above the float is arranged a series of baffles *F* and *G*, which prevents any large drops of water from passing out of the washer with the air. The top of the float tube is provided with a cap *C*, which prevents any chunks of dirt entering the tube, and also acts as an air shut-off when the water is almost exhausted, thus automatically stopping the engine and warning the driver that the air washer is in need of refilling. If this is impossible immediately, the motor may be again operated by utilizing the water filler *I* as an emergency air entrance. The upper end of the float tube is further protected by the housing *L*, all the air being forced to pass between the edge of this housing and the upper tank at low velocity.



Section through Holley carbureter air washer

This type of air cleaning device was adopted as the one presenting the most desirable features, after a very careful review of the possibilities of construction.

Air purifying apparatus as used in other lines of business has been of two main types—wet and dry. The dry type has been used mainly in such devices as exhaust heads for collecting shavings, sawdust and similar materials. The wet type is used in conditioning air for public meeting places, and the factories of those concerns the preparation of whose product is dependent on maintaining certain fixed conditions of the air as regards absence of dirt, temperature, humidity, etc. Among the many lines of business employing apparatus of this type may be mentioned photographic supply manufacture and tobacco manufacture.

The dry type of air purifying apparatus for use on trucks and tractors must depend either on centrifugal force or large areas of fine mesh screen. The results of tests along these lines were discouraging, either because of incomplete cleansing action, or large space required if the supply of air to the carbureter was not to be greatly restricted.

The wet type of air washer was chosen because of the following advantages:

1—Practically complete removal of dust or dirt entering with the air.

2—Very slight power required for operation (if any).

3—Relatively small size.

4—Slight increase of power delivered by the motor if using an exhaust heated carbureting device.

The only serious objection to this type of apparatus is the consumption of water in those regions where the humidity is low and temperature high. Tests so far have shown water consumption between 1/20 and 1/10 lb. per horsepower per hour; this was with humidity ranging from 25 to 75 per cent and with air temperature approximately 80 deg.

It is impossible to reduce this water consumption by any mechanical means, as tests have shown that no water leaves the washer in the form of drops, but that all the water used is taken up as water of saturation of the air. In no case has the air leaving the air washer been completely saturated.

This type air washer is particularly suitable for use with the Holley vaporizer, or other exhaust heated carbureter, but may be used satisfactorily with ordinary carbureters with practically no change in adjustment. A recent test by a prominent truck maker showed the same power and fuel consumption with and without the air washer, using the regular gasoline carbureter. It is probably advisable, however, to apply heat between the air washer and the carbureter.

Balancing Machine Improved

Akimoff Design for Dynamic Balancer Simplified for Manufacture—Production Studied and Capacity of Tool Greatly Increased

WHEN the Akimoff balancing machine was described to the S. A. E. last January it was immediately realized that an enormous advance had been made in the design of a tool for the dynamic balancing of rotating parts. It was the first machine to indicate the position and amount of unbalance in a rotating part in absolute terms; the first to eliminate trial and error from the process of balancing. Much more easy to use than earlier machines, it appealed as being the sort of tool that could be used on a large production of crankshafts or other revolving parts without high cost; especially, perhaps, because it obviously did not need the attention of a highly skilled operator.

Operation Much Easier

The manufacturing rights are now in the hands of the Carlson Wenstrom Co., Philadelphia, and as redesigned by J. Lundgren, manager mechanical department, the ease of handling has been improved enormously beyond the previous high standard. Regarding it from the operator's viewpoint there is nothing to do but turn two hand wheels, read a dial, make a mark on the object being balanced, and tag it with the amount of weight to be removed or added.

Any rotating object can be balanced either by removing weight from two places or by adding weight at two other places. Sometimes it is easier to use the removal method, sometimes the other, it depends upon the nature of the piece to be balanced.

There are three factors, the weight added or subtracted from the two places, the radius from the center of revolution of those places, and their distance apart. The radius and distance apart will be constant for any piece to be balanced, because two convenient places will be chosen, such as the first and last webs on a crankshaft for example. Thus it remains to find the third factor, the weight that must be removed or added at these points.

The Akimoff machine consists of a heavy bed hinged to its support at one end and resting on springs at the other. Above the bed the object to be balanced is mounted. Beneath the bed is a piece of apparatus by means of which any degree of unbalance can be created. The object to be balanced and the balancing apparatus are geared together and driven by an electric motor. The apparatus beneath the bed is set neutral, so that it produces no unbalance, and the machine started. Then, while running, the vibration caused by unbalance in the object is indicated on a dial which shows any quivering of the bed on its spring support. Still running, the apparatus beneath the bed is adjusted till it has an unbalance which neutralizes that in the object, and vibration of the bed ceases. Knowing the amount of unbalance beneath the bed, which has been created deliberately, we know that there is the same amount in the object.

There is one other thing which has to be discovered and this is the plane in which the unbalance lies. Suppose the object to be balanced is the armature of an electric machine. Then all we know is that removing weight from two places (one at each end of a diagonal lying in an axial plane) will bring the piece into balance. Besides discovering how much weight has to be removed from each of the spots, we also have to find the plane in which they lie. The apparatus beneath the bed in which unbalance is produced is thus also required to show its plane as well as its amount, and the method of permitting this reading to be taken is the greatest feature of the improved design.

Method of Using

First to follow the action of the apparatus. Fig 3 shows all the parts. At the right, hung from the bed, is the electric motor which drives the balancing mechanism, and also the object by means of a gear train. A and B are two masses which revolve, with their shaft, at the same speed as the object above. By means of the hand wheel C and the right and left screw D these masses can be moved up and down the shaft while the machine is running. They always move equally in opposite directions, and when they are together at the center of the shaft their overhanging ends overlap, so that the two make one piece and there is then no unbalance whatever.

With these masses the radius of the unbalanced end from the center of rotation is constant, and the variable is the distance apart. The amount of unbalance is measured and re-

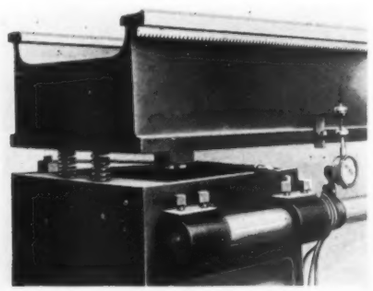


Fig. 1—Upper—End of bed, showing spring supports and vibration indicator. The small lever on left of indicator is a stop which damps out vibration when raised

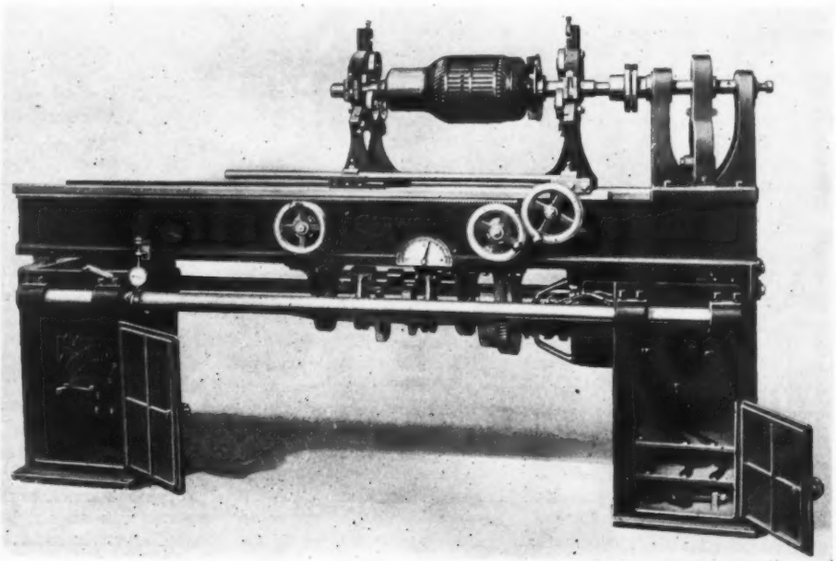


Fig. 2—Right—Complete Carlson Wenstrom built Akimoff balancing machine with all fittings ready to test electric motor armature

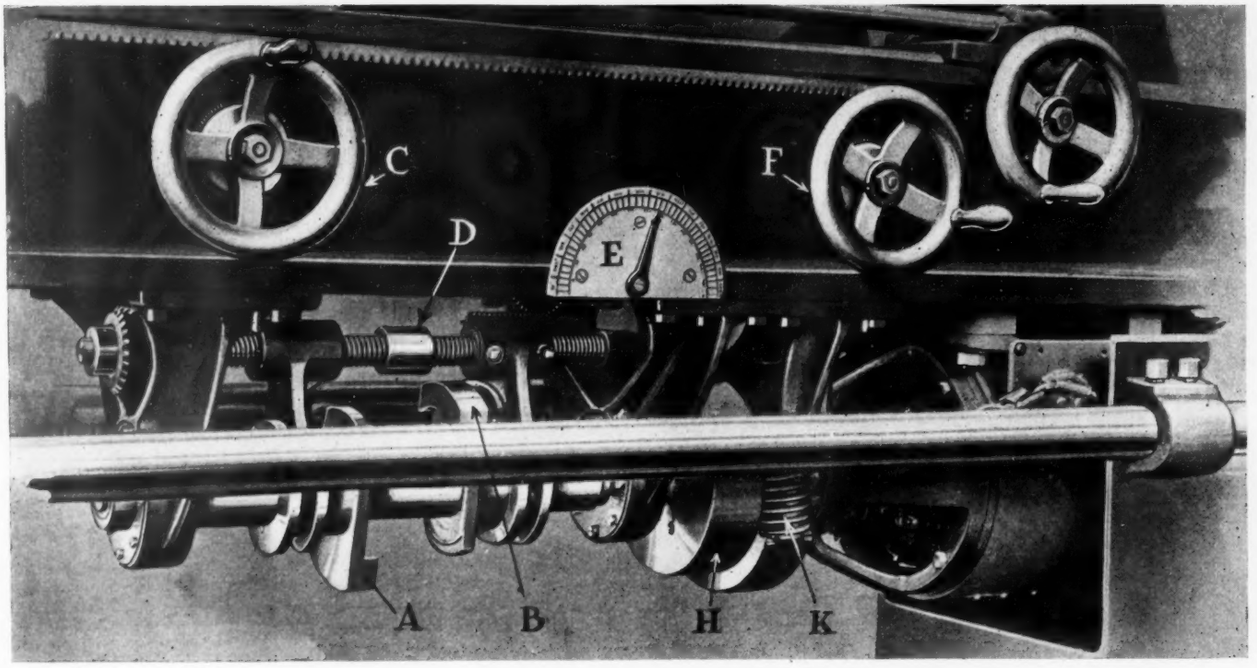


Fig. 3—Details of redesigned Akimoff machine. A and B are the adjustable masses for finding the unbalance of the object to be tested. C and F are the only controls which have to be moved

corded on the dial E, which is graduated in ounce inches, which are the result of multiplying the amount of weight on the heavy ends of the balance masses by the radius, giving a constant; and multiplying by the variable, which is the distance apart of the masses.

We have already chosen the radius and distance apart of the places on the object where weight is to be changed, so if we read the ounce inches of unbalance on the dial comparison with a very simple table shows the weight to be altered on the object.

Finding Plane of Unbalance

So much for the *amount* of unbalance. To get the *plane* of unbalance we must bring the plane of unbalance of the *object* into phase with that of the balancing masses, since no adjustment of the weights will give balance unless the unbalance of both object and machine is in the same plane. In order to allow alteration of phase while running, the balancing shaft has an internally toothed gear at the right end marked H in Fig. 3. On the electric motor armature is a sun wheel, and a single planet pinion transmits the drive from the motor to the internal gear. This planet pinion is mounted on a cage which can be rotated around the center by means of the hand wheel F and worm gear K. On the outside of the internal gear H the dead centers of the balance masses are marked, and a pointer enables the balance shaft to be set so that the plane of unbalance is exactly vertical. Thus when balance has been obtained the machine is stopped and then pulled around by hand to the dead center mark.

If we want to *add* material to the object we use the dead center position with the heavy end of B up and that of A down; if we want to *remove* material for balancing the object we use the opposite center with A up and B down. Having set the machine after balancing, a mark is made at the top right end of the object, thus indicating the exact plane of unbalance. On a crankshaft this will usually come near the middle of the width of a web, but it varies a few degrees either side of the symmetrical center of the web.

The total time occupied in getting the balance is under two minutes and an ingenious bearing arrangement and coupling permits the crankshaft or other object to be removed and replaced in minimum time. The bearings which carry the object consist of three rollers which can be adjusted radially so as to suit shafts of different diameters. When set for one size, to change the piece one roller is released and the shaft lifted out. For connecting the drive in the case of a crankshaft with a flange end there is a corresponding flange on the headstock and a short arc of flat spring steel carries right and left pins which socket in holes in the flanges. This gives a drive without any backlash but with enough flexibility to compensate for any minute variations in alignment. Thus changing the shaft is as speedy as balancing it, and the manufacturers of the machine state that a schedule of fifteen crankshafts an hour can be maintained easily.

One beauty of the Akimoff machine is that the speed of rotation has not got to be very high. Normally about 450 r.p.m. is enough, but the motor furnished is a variable speed machine and, if it is desired to balance at some other rate of revolution, it is only necessary to alter the springs which support the left end of the bed. The speed and the periodicity of these springs should be approximately the same if the vibration is to be most readily observed.

The form of machine it is proposed to manufacture first will handle objects up to 20 in. diameter and 4 ft. 6 in. long. For very small objects, such as armatures of small motors, the delicacy would be insufficient, but it is just right for crankshafts and anything larger. The average six cylinder crank, it is stated, will rarely run over 60 ounce inches out of balance and can be brought into balance easily within 2 ounce inches of perfection.

Complete with all equipment the machine sells for $3,000 f.o.b. Philadelphia and it needs a space for itself and the operator 8 ft. long by about 3 ft., 6 in. wide.

The company is at present prepared to produce three or four machines a week and has designs for nine sizes. The smallest is for objects weighing down to 3 lb. and the largest will take a 14,000 lb. armature for a big electrical machine. The third size from the smallest is the machine illustrated and is the one most required by the automobile trade. Its limit for weight is about 150 lb. An interesting fact is that the positive nature of the Akimoff machine has made it applicable to many industries.

Cord Tire Molds

OWING to the fact that Goodyear cord tires are larger than other tires, sectional repairs should be cured in a mold one size larger than the size of the tire. For example, a 4-in. tire should be cured in a 4½-in. mold cavity.—D. R. CAIN, Instructor, School of Tire Repairing, Goodyear Tire & Rubber Co.

Fig. 1—Setting Hupmobile crankcases by locating mark in milling machine for first cut

Movement Minimized *in* Building Hupmobile Engine

Part II

Crankcase and Cylinder Machine Operations — A 64-Spindle Drill Saves Time on Crankcases—Oven Type Jig

By J. Edward Schipper

IN Part I, last week, the layout of the manufacturing departments of the Hupmobile engine was described. The machine operations and the jig work follow each other in a natural progressive system as outlined by the general scheme of manufacture.

The cylinders and crankcases arrive at the Hupmobile factory with lines marked on the sides, from which all measurements are made. These lines on the crankcases indicate that the foundry has checked the casting and found that by measuring from this locating mark there is sufficient metal in the casting to take care of the subsequent manufacturing operations. Thus it is only necessary in the first operation on the crankcase, which is the top and bottom milling, to locate the milling cutter from these indicating marks on the sides of the castings. Fig. 1 shows the operator with his measuring guide locating the crankcase on the milling machine table, so that the milling cutter will strike the crankcase at the proper distance and take off the required amount of metal in accordance with the check marks placed on it by the foundry.

The first milling operation has seven cutters and finish-mills the bearings and the bottom of the crankcase. The second milling operation rough-mills the top and finish-mills the ends. The final milling operation finish-mills the top, giving it a square and smooth surface for the bottom of the cylinder casting. The next few operations are largely drilling with multiple spindle drills. It will be noted that what may be called the oven type of jig is used, in which the crankcase is placed in the jig, with the drills coming through the holes in the top. This first multiple spindle drill, which is shown together with the jig in Fig. 2, drills all the top holes in the crankcase casting and reams two of them, which act as locating points for the reaming operations. The reamers which take care of the two locating holes are held to a tolerance limit of 0.001 in. They are diagonally opposite each other on the casting. This first drill has twenty-three spindles.

Second Operation

The second drilling operation is a sixty-four spindle job to take care of practically all the holes on the bottom of the case and both ends. This machine operates from three sides, and the oven type of jig is also shown in Fig. 3, which shows the operation. All of the holes in

the bottom flange are then tapped on a thirty-three spindle machine using 5/16 in. 18-pitch taps, after which all the bearing stud holes are counterbored and tapped. The machine which counterbores and taps the bearing stud holes has a total of twenty spindles. It is Hupp practice to assemble the caps on to the main bearing studs immediately after this operation and then to straddle-mill all the main bearings. Another milling operation which is carried out at this point is that of the starter and generator faces, which is done with two cutters.

The main bearings are rough-cut, semi-finished and reamed by three cuts on the same machine. This machine also bores the hole for the electric starting motor. The operation and mounting are shown in Fig. 4.

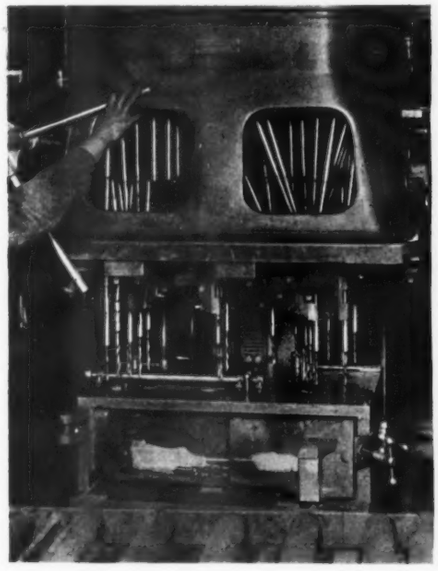
The next steps in progression are the milling of the ends of the crankcase to take the transmission bell housing, to mill the oil scoop which forms the pump in the oil system, and to bore the crankcase rear end for the transmission pilot.

The camshaft bearings are taken care of in very much the same way as the crankshaft, being rough-bored, semi-finished, and reamed on the same machine, which is a 21-in. Kokomo drill press.

Drilling and Reaming Dowel Holes

Drilling and reaming of the dowel holes for the main bearings is next, and in doing this it is necessary to take off the assembled caps and drill them for the dowels. The holes for the starting motor supporting bracket are then drilled and tapped and various minor operations of drilling, tapping, etc., for such parts as the throttle-control members, tappet bushings and finishing operations on the starter holes, are performed. The conveyor then passes through an automatic washing machine carrying the crankcase with it, as shown in Fig. 5, after which the crankcase goes to the inspectors' test bench indicated in Fig. 10 at the end of the crankcase.

The progressive steps of the cylinders are very similar



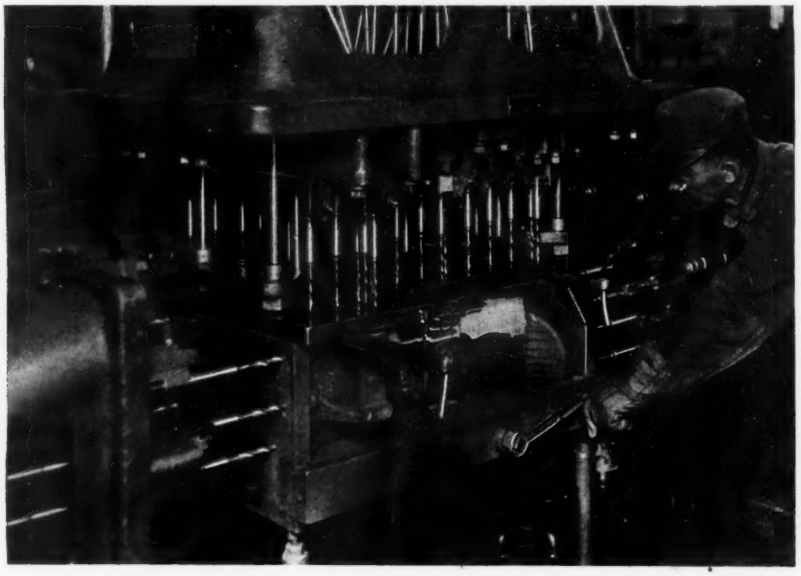


Fig. 2—Left—Drilling holes in the top of the crankcase casting. This machine also reams two holes which act as locating points

Fig. 3—At the right—Sixty-four spindle machine which drills practically all the holes in the bottom of the case and on both ends, operating from three sides

Fig. 4—Machine which cuts the crankshaft bearings in the crankcase casting. This also bores the hole for the electric starting motor

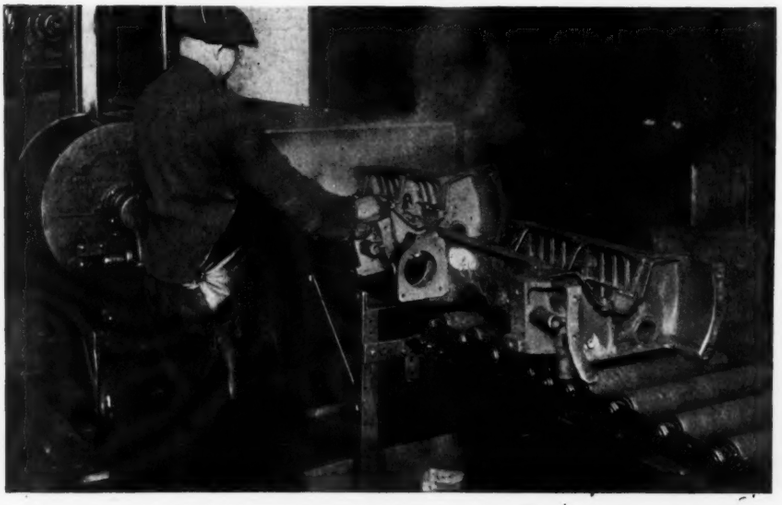


Fig. 5—Carrying crankcase castings on a conveyor through an automatic washing machine, after which they go to the inspector's test bench

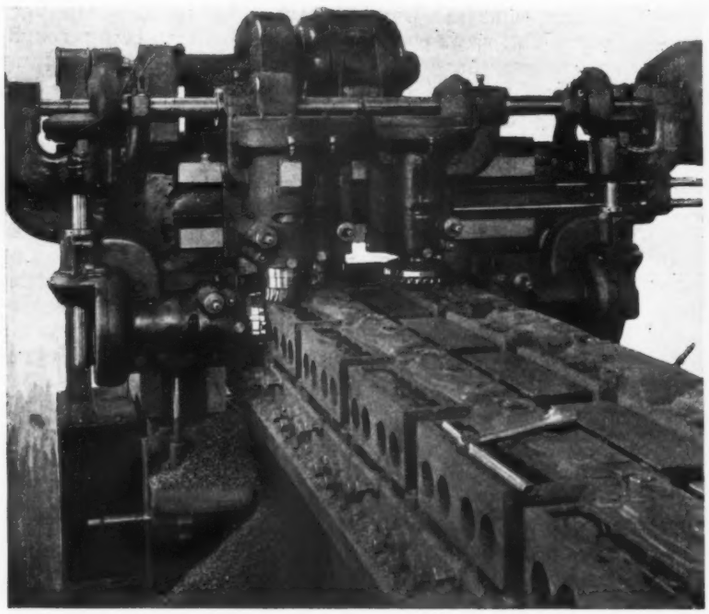


Fig. 6—Cylinder blocks receiving first mill cut on two sides at a time. This is an Ingersoll milling machine

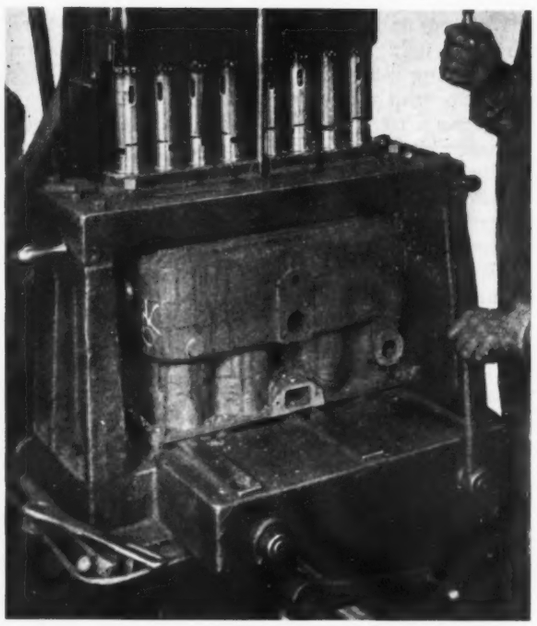


Fig. 7—Boring the valve plug holes in the cylinder casting. Note type of jig used

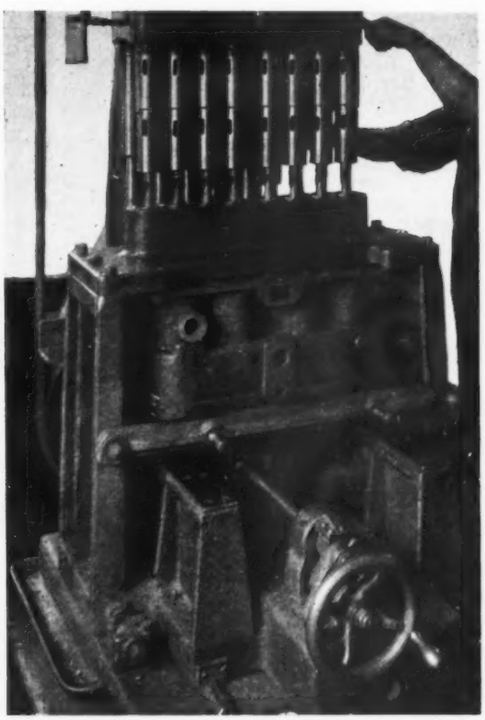


Fig. 8—Valve tappet holes are drilled and reamed on this machine

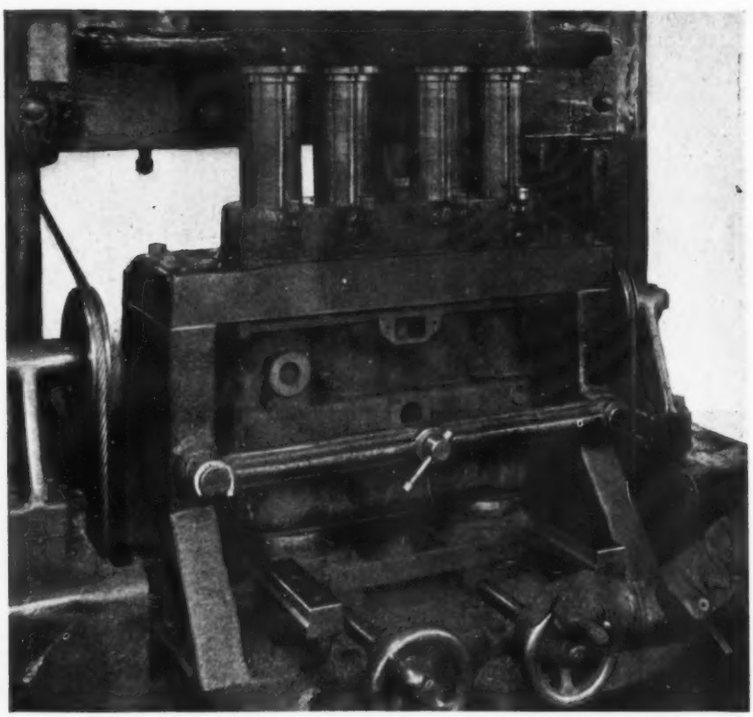


Fig. 9—First cut on the boring of the cylinder casting, which operation follows the reaming of the valve stem holes and the valve tappet bushings

to those of the crankcase. They are located in the first milling operation from the inside of the combustion chamber. This method of location is used because it results in giving a uniform compression volume to each of the cylinders. Thus the locating point has been chosen as inside the combustion chamber so that when the metal is taken off by the milling cutters the same volume will be given each combustion chamber within the limits of casting accuracy, that is, on the finished job the distance from the bottom of the cylinder flange combustion chamber will be the same. Fig. 6 shows the cylinders on the table of the first milling machine passing through the cutters, which mill them on two sides at a time. The castings are then turned over and milling is completed. This is an Ingersoll milling machine of the type commonly used for this sort of work.

After the milling operations the drilling processes are carried out progressively in the same way that they are in the crankcase manufacture. The first one of these operations is to drill all the holes in the bottom flange,

Fig. 10—Inspector's bench, where the finished cylinder castings are given the final check before going on to the complete assembly

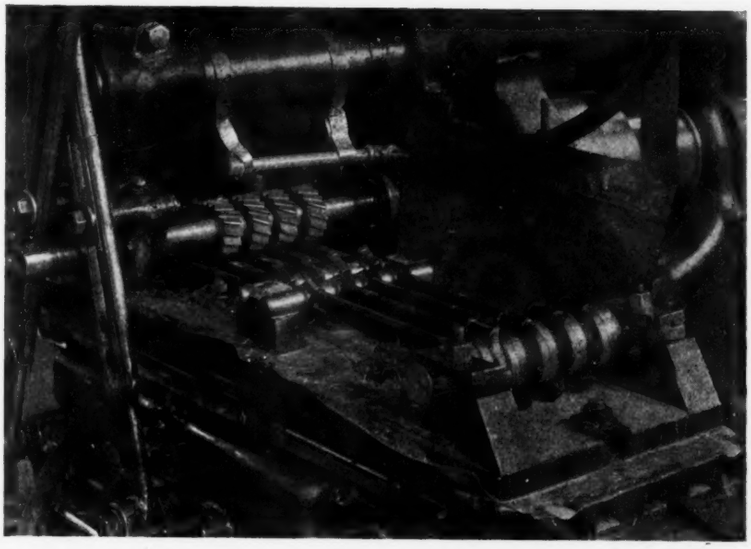


Fig. 11—Connecting-rods are purchased in the blank and are first straightened by hand and then milled on the sides and ends

Fig. 13—Tapping holes in Hupmobile flywheels. Plain type jigs are used

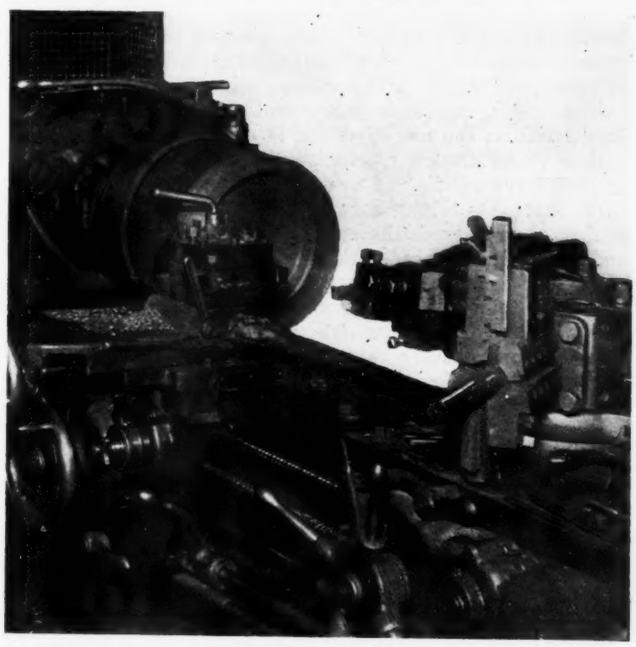


Fig. 12—Lathes doing the finish-cutting work on the flywheel, which is one of several machine jobs on this part

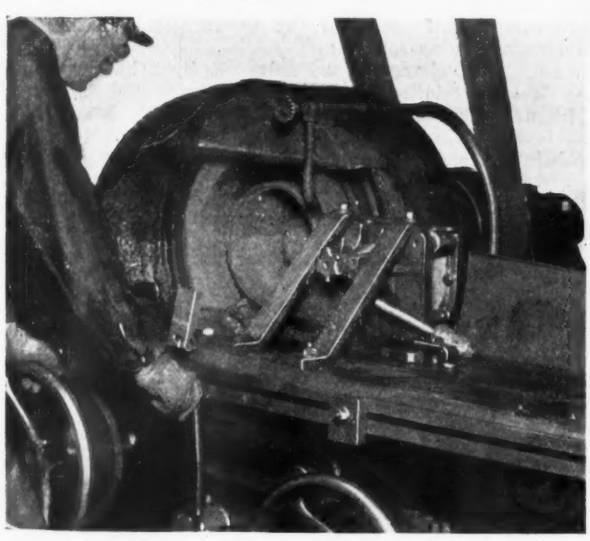


Fig. 14—Grinding operation for the chain covers

four of which are reamed, two of the reamed holes being locating points for future operations. This is an eight-spindle job.

The next drilling operation is a thirty-two-spindle machine in which all the small holes in the top and both sides are drilled on a forty-spindle machine. The use of the oven-type jigs previously mentioned is carried out in this work, giving an accurate method of locating. This is clearly shown in Fig. 7, which illustrates the boring of the valve plug holes, and Fig. 2, which shows the machine on which the valve tappet holes are drilled and reamed.

An interesting drilling job is that in which the valve stem hole is center drilled, the valve port opening is bored and the valve stem hole drilled. This gives three operations with two sets of spindles, this being accomplished by means of combination spindles. The valve stem holes are reamed and the valve tappet bushing is

reamed, after which the cylinders themselves are bored, the first cut on this job being shown in Fig. 9. In finishing the cylinder boring an accurate reaming is given. The succeeding jobs are step by step machine work, dealing with detail parts of the cylinder, such as drilling and counterboring the core pin holes, which are drilled and pipe-tapped, milling the connecting-rod clearance in the ends of the cylinder bores, and chamfering the ends of the cylinder bore, finish facing the valve seat and tapping the valve plug holes, drilling the oil passage hole between the cylinders, spot facing the cylinder studs, counterboring valve spring seat, and finally, tapping all the small holes and passing the cylinders on to their conveyor through the automatic washer.

After the washing, the finished cylinder castings proceed to the inspector's bench, where they are given final check, as shown in Fig. 10, before going on to the final assembly. This completes the large parts department in the engine manufacture. The manufacture of the small parts is one of detailed machining, in straight line progression. The pistons are secured outside. The connecting rods are purchased in the blank and are first hand straightened and then milled on the sides and ends, as shown in Fig. 11. This is a distinctive operation, as it gives a rod which is machined all over and is a process which is set down as one of the reasons for the smoothness of operation of the Hupmobile motor, giving a rod of minimum weight and accurate balance and finish.

The milling work is performed on these rods on an index fixture, the use of which is quite common in Hupmobile manufacturing practice. The other steps in the manufacture of the rod are taken care of progressively, three machines taking care of both ends. The large end is first rough-bored, the small end drilled, and the large end then finish-bored. Both ends are broached on a broaching machine at once. The rod is then hollow-milled to take off surplus metal. The cap bolt flanges are milled and the caps drilled for the bolt holes. On this job, six rods are taken care of to a fixture. These holes are afterward reamed, the piston pin and clamp bolt holes drilled, and after milling and slotting the upper end of the rod to take the piston pin clamp, the caps are split from the rods and the bearing dowel holes drilled and reamed.

Flywheel Manufacture

The flywheel blanks are secured outside, the first step in the Hupmobile factory being the roughing of the front side of the flywheel. This is then finished and the other side of the wheel given a finish cut, after which the flywheel is drilled. The lathes doing the finish-cutting work on the flywheel are shown in Fig. 12. There are several other machine jobs to be done on the flywheel, such as reaming the clutch stud holes, counterboring the holes for the crankshaft flange, tapping eight holes for the starting motor ring gear, and, finally, inspection. The flywheels, being somewhat heavy in the early stages of manufacture before the larger part of the metal is removed, are carried on a gravity conveyor, which lessens the manual labor of handling. The jigs used are of the plain type, as shown in Fig. 13.

Chain Case Manufacture

In the Hupmobile, the chain case cover is an iron casting. This necessitates milling of the bottom flange and milling of the cover face, after which the holes are drilled out twice and reamed for locating purposes. The boss for the fan shaft cover is faced, with the necessary holes tapped and drilled, after which the flange face of the cover is ground in order to give a tight fit, so that there will be no oil leakage at this point. This grinding operation for the chain cover is shown in Fig. 14. It will be noted that the location of the work is done by means of the two reamed holes and a fixture clamped to the table of the grinding machine.

These small parts are carried to the center aisle, from where they pass to the assembly room, which will be described in the final article of this series.

New 1- and 2-Ton Dearborn Truck Units

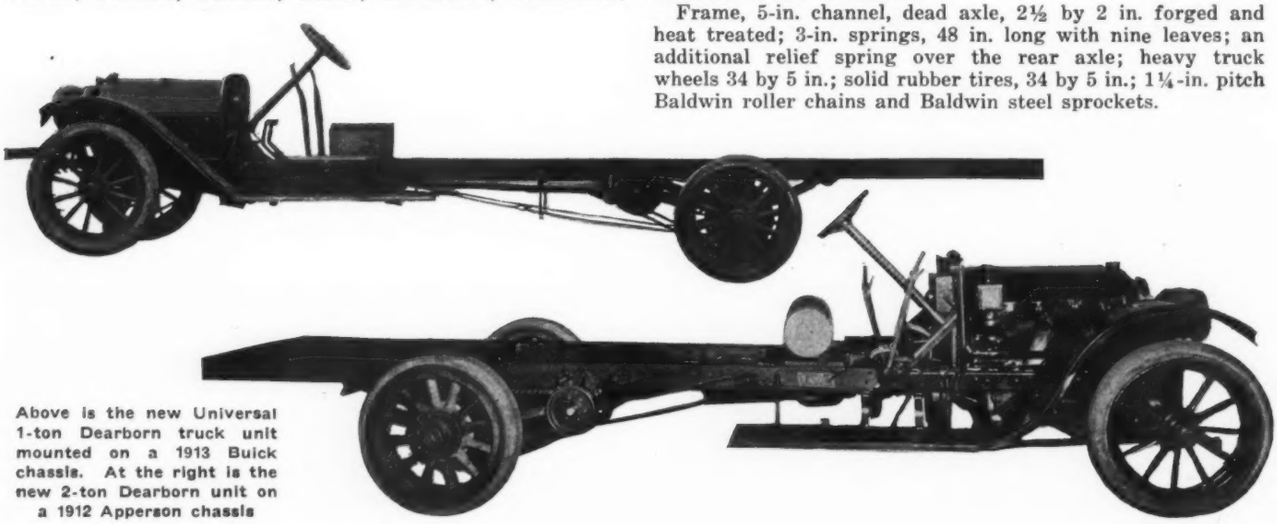
TWO new truck units adaptable for use with any standard chassis have been brought out by the Dearborn Truck Co., Chicago. One has a 1-ton and the other a 2-ton capacity. The new units are similar in construction to the original Dearborn attachments, which were designed for the Ford car.

The new 2-ton Dearborn units can be attached successfully to cars having power plants of 40 to 50 hp., such as Pierce-Arrow, Packard, Peerless, Lozier, Locomobile, Oldsmobile, the larger models of the Hudson and other cars in this class.

Adaptable to the new 1-ton unit and even to the 2-ton, if desired, are such cars as Overland, Maxwell, Buick, Dodge, Studebaker, Hupmobile, Chandler, etc.

Of course, the larger units have heavier frame, wheels, etc., than the 1-ton unit, which is really very similar to the original Ford attachment. Some of the specifications of the 2-ton attachment are as follows:

Frame, 5-in. channel, dead axle, 2½ by 2 in. forged and heat treated; 3-in. springs, 48 in. long with nine leaves; an additional relief spring over the rear axle; heavy truck wheels 34 by 5 in.; solid rubber tires, 34 by 5 in.; 1¼-in. pitch Baldwin roller chains and Baldwin steel sprockets.



Above is the new Universal 1-ton Dearborn truck unit mounted on a 1913 Buick chassis. At the right is the new 2-ton Dearborn unit on a 1912 Apperson chassis

Promising Automobile Future *in* JAPAN

Only 1341 Cars to a Population of 60,000,000—Increasing Prosperity and Growing Appreciation of Motor Vehicle Possibilities Forecast Boom—Closed Cars Popular

By Hi Sibley

TOKYO, JAPAN, April 11—The status of the motor car in Japan to-day is about where it was in America in 1900. In a population of 60,000,000 there are only 1341* automobiles, nearly three-fourths of which are registered in Tokyo, the capital city and metropolis. There is one small, but alert, motor club, and Japan's one and only automobile magazine, *Jidosha*, expired 2 years ago after a heroic struggle to survive motoring apathy. And—this on good authority—there is but a solitary gasoline sales pump in the whole country!

Regarded Cars as Costly Toys

Plainly the automobile has had a hard struggle for existence, to say nothing of expansion. Since its introduction in 1903 it has had innumerable setbacks. Three years ago it was barely getting a toehold, so to speak, when along came the European war and effectually brought its laborious progress to a halt. Prior to that time the intrepid importer of cars had existed largely on optimism, for until very recently the thrifty Japanese have regarded the automobile as a costly toy. Moreover, the importer virtually had to include a skilled mechanic in the list of accessories, and accept payment on the installment plan, only to discover that, after two or three payments had been made, the original purchaser transferred his title to another individual, thus naively washing his hands of any further obligations. The importer's only recourse was a criminal action, from which procedure he recovered nothing; more than likely he was out court costs and attorney's fees.

Many Obstacles to Sales Growth

Other causes for retarding the advance of the automobile are many and varied. In the first place, the per capita wealth of the Japanese has been very moderate—something like an eighth of that in America—and obviously a very few have been able to afford a car with the, at present, excessive freight rates and 35 per cent import duty. The Ford, for instance, costs the user about 2000 yen ($1,000) delivered in Japan, while 4000 yen for a Hupmobile is almost staggering to a people to whom the yen looks bigger than our dollar does to us. Other makes of cars, of course, cost in proportion.

Coupled with this, the Japanese are intensely patriotic—Buy in Japan First! is their sentiment, if not their slogan, and aside from their thrifty habits they have an inherent distaste for letting such comparatively large sums go out of Japan that do not directly develop home industry. Were the cars manufactured in Japan the situation might be altered in a measure, but attempts to manufacture light cars adapted to the country by Japanese concerns have been complete failures, and it is not likely that cars ever will be manufactured in Japan again until American engineering skill combines with Japanese capital and the import duty on proper materials is greatly reduced. This is the unanimous opinion of prominent Japanese in close touch with the situation.

*Figures given by Nippon Automobile Club.

Then again, the man of means in this country looks upon the automobile more as evidence of prosperity than as a means of recreation. The smarter its appearance the greater its value to him. The car has exhausted its possibilities as a means of luxurious conveyance to city clubs, state and social functions, where it pleases his vanity to arrive in high style. The thought of touring never enters his head; he would not subject his well groomed car to the mud and rough usage it would receive on the country roads, and admirable as the Japanese are in many respects, our sporting blood appears to be lacking in them entirely, as far as the automobile is concerned. A family party starting out on a picnic expedition with lunch baskets and camera and veils and things is never seen in Japan. Even for short distances between cities the native will not use an automobile when he can take a train or tram.

Gasoline 45 Cents a Gallon

The price of gasoline is no small obstacle, generally about 45 cents a gallon, though there are a dozen grades at as many prices, and this limits extensive use of the large car to the very wealthy. Except for short runs to the better class watering places and scenic points near Tokyo and Kobe, the amount of country touring is negligible, even among the more sportive resident foreigners, for while many of the roads are excellent, though narrow, and the scenery in the mountain districts unsurpassed, bridges are frequently too frail to withstand the weight of the average car, and usually are washed away entirely during the torrential rains of the summer months. Also, the heavy rains render many of the roads impassable, and often turns are too abrupt for cars of long wheelbase.

The competition, or rather the monopoly of the jinrikisha, locally known as the "kuruma," is a great factor standing in the way of automobile expansion. They are legion in all the cities and towns, and rates are extremely reasonable. Naturally, they are highest at the hotels patronized by tourists from abroad, about $1.50 per day, but generally a native can ride a "ri," or 2½ miles, for from 15 to 25 cents in any kind of weather, and as comfortably as he would in a motor car. And the kuruma is more adapted to the narrow, crowded streets and abrupt turns of the average city. If it is cold or rainy, the top, side curtains and storm apron inclose the passenger snugly, and the runner never seems to tire, taking some of the steepest grades at a trot. A great many Japanese maintain private kurumas, whereas to own a motor car he must employ a chauffeur (no owner ever drives his car) at from $15 to $25 a month, and his gasoline account is frequently as much more. In addition to this a motor car license for a 24-hp. car is $60 yearly.

Turning Point at Hand

And, summing all this up, the automobile has had much to discourage and hamper its general adoption. But the turning point is at hand; importers, both Japanese and foreign, predict a good future for the automobile in this country. The

Japanese have more money to-day than they ever had; the war has opened up new markets to them, and they have manufactured and exported a tremendous amount of goods, principally to Russia. Even now the hotels are filled with Russian buyers, American buyers, and even English and Italian. New ships have been added to their trans-Pacific lines where freight and passenger traffic demand has far exceeded every inch of available space; manufacturing concerns have declared the largest dividends in their history and are doubling plant capacity, and banks have reported enormous deposits. Japan is on the high tide of prosperity.

And what is more to the point, when the Japanese military attachés return from their observations in the European war zone, where the motor car has been the principal factor in carrying out operations in every line of activity, there is going to be a nation-wide interest in the promotion of the automobile in Japan for all purposes. For the Japanese are not only aggressive, but progressive, and the one national ambition is to occupy a prominent place among the great powers of the world. They deserve the greatest credit.

Tokyo the Automobile Center

Tokyo, being the capital and largest city, is naturally the automobile center of Japan. It has a population of 2,250,000 and there are about 950 cars owned in the city, the last automobile census of Dec. 1, 1916, reporting 785 cars, including trucks. Nearly all the privately owned cars have inclosed bodies, many of the handsomest made in Japan, for the better classes desire privacy wherever possible, and all of them are driven by liveried chauffeurs without exception. In many cases there is a footman as well. Rarely a native buys an open car, but in that case he invariably rides about with the top up and side curtains on, even in the fairest weather. There are few months when the inclosed body is incompatible, for rains are frequent and heavy, and winters as severe as ours. Besides, in the extremely hot weather of July and August the inclosed body affords protection from the heat, as well as from the wind and dust, which are very annoying to the dainty Japanese ladies with their loose kimonos and elaborately arranged hair.

The cars for hire usually are with open body to secure greater passenger capacity, and about 40 per cent of the cars in Tokyo are in this business, which is very lucrative. Rates are from $1.75 to $2.50 per hour, and small garages with two or three cars for hire are found all over the city, principally in the tea house districts, where most of the trade is to be had.

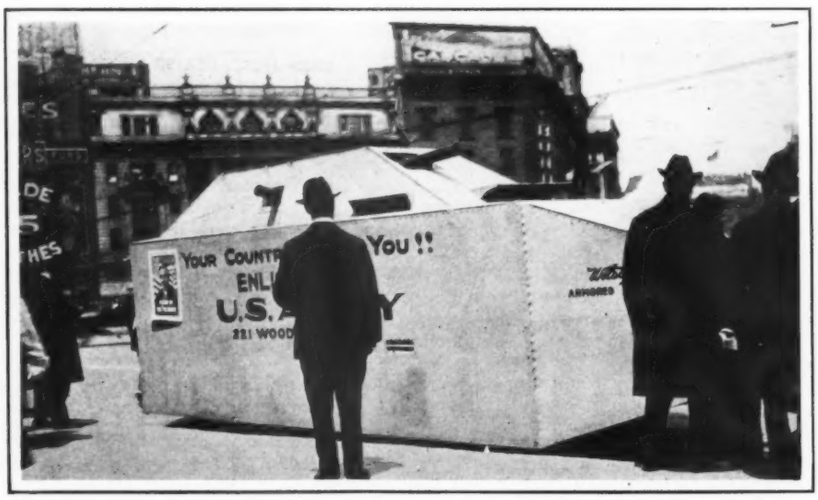
The average Japanese chauffeur's driving, however, does not inspire confidence in the tourist, for he will speed through the crowded streets at 30 m.p.h., while kurumas, coolie carts and pedestrians scatter right and left, and terrified mothers snatch toddling offspring from accustomed haunts in the middle of the streets. The city speed limit of 10 m.p.h. does not seem to be enforced in any section, yet in spite of the most reckless driving the writer has yet to hear a complaint or harsh word from pedestrian or coolie. They seem to regard this strange shrieking devil-wagon as the acknowledged lord of the highway.

The foreigner from Europe or America is impressed with the small number of cars seen on the principal streets, some of which, by the way, are the equal of main thoroughfares in American cities. Even in front of the largest office buildings in the modern part of the city one sees rarely more than two cars parked in a whole block, and often not any for several blocks. The writer stood at the intersection of two of the busiest streets, two most frequented by motor cars, and during an hour at noon on a week day counted only forty-three passenger cars and four trucks. Eighteen of the pleasure cars were of European make, while among the American cars were fourteen Fords, two Buicks, two Hupmobiles, and one each Overland, Oakland, Cadillac, Maxwell, Paige, Hudson and Locomobile. And thirty-nine of the forty-three had inclosed bodies. At a fashionable Japanese wedding thirty-one cars, all inclosed, of nearly as many makes drew up in front of the Imperial Hotel, while there were over 200 kurumas, and it was a cold and rainy night. This is a fair sample of the comparative use of the motor car and kuruma, even among the well-to-do.

But Tokyo should be a delight to the prospective motorist, for there are several wide thoroughfares leading to the six principal parks, which at this writing are in all their glory with the delicate pink masses of cherry blossoms. There are innumerable smaller parks and many of the smooth macadam streets are bordered with cherry trees in full bloom, and in addition to this there is no end of Shinto and Buddist shrines and temples and other points of historic interest most conveniently reached by motor car. To be sure, some of the byways in the older parts of the city are very narrow and difficult of navigation by the motorist, but with 180 miles of streets over 24 ft. wide, an automobile can be driven anywhere in the city without great annoyance. A fine of 3 yen, or $1.50, is imposed for driving on streets narrower than 24 ft., without a police permit, but whenever such a street burns down—as frequently happens and with astounding thoroughness—the width is increased in rebuilding.

Pennsylvania To Appropriate $7,000,000 for Highways

THE Pennsylvania Senate and House of Representatives have agreed to appropriate for the next 2 years $7,000,000 for construction of State highways in the boroughs and townships. State Highway Commissioner Black, in discussing highway work for the appropriation period, said: "The department is opposed to building any other than high types of permanent highways. Concrete should enter into the foundation of every road, as in the construction of the more permanent types of wearing surfaces it is essential that the foundation be of an unyielding character."



A Recruiting Tank

A TANK made by the J. C. Wilson Co., Detroit, has been used in Detroit to stimulate recruiting. It measures 25 ft. in length, 7 ft. in width and 9 ft. in height, with armor plating extending to within 10 in. of the ground and running to a V at the ends. In the slope sided superstructure are mounted four large guns which for publicity purposes are cleverly equipped to utilize the exhaust gases from the motor. Each broadside of the tank bears appropriate signs urging prompt enlistment to win the war.

Systematic Routing Eliminates Labor Waste

Van Dorn & Dutton Gear Plant in Cleveland Was Built to Permit Continuous Operation — Group System of Power Transmission Employed

AN important factor in the general efficiency of the modern plant is the economic and systematic production of its work, embracing careful routing of orders and the arrangement of departments and machines so as to eliminate all unproductive labor. An example of specialization and systematic production is offered by the new Van Dorn & Dutton plant, recently placed in operation in Cleveland. This company makes gears.

The making of a gear embraces ten different operations in the plant—going from the receiving department through the turning, inspection, spur cutting, inspection, heat treating and hardening, sandblasting, grinding and finishing, scleroscopic test, and shipping departments. The plant has been departmentized, so arranged and located that the work proceeds down the floor from one department to the next with minimum of handling.

In the administration building all correspondence is received and all orders issued from the executive offices on the second floor, whence they are sent along systematically through the various departments on the first floor to their final destination.

The plant is built on the brow of a hill and constructed to conform to the topography of the site.

Main Factory Built in Two Sections

The main factory building, which is connected by a bridge to the administration building, is constructed in two sections. The front section is devoted almost entirely to the production of automobile and tractor gearing. The rear section is built on one floor, the front part extending under the rear of the front section, making the structure three stories high at this point. This part houses the receiving and shipping rooms, centrally located and easily accessible to all parts of the building. The remainder of the floor is given over to the mill and industrial gearing, both large and small, motor gears and pinions and the heavier type of tractor gearing.

At the rear of this section is a large substory room used as a main stockroom, supplemented by sub-stockrooms on each floor. Doors along the west side of this room open on a wide loading platform, where materials are unloaded from the cars and from there conveyed to the stockroom. Shipping by carload lots is also handled over this platform, the gears being conveyed to the stockroom by a large electric crane.

It is the intention of the designers to incorporate this substory into the next section to be built and to continue adding sections in this manner until the buildings will form a sort of giant's stairway up the hillside upon which the factory is located.

The hardening and heat-treating department is housed in an out-building. The blacksmith shop and pattern storage building is expected to be added to this structure very soon.

Light and cleanliness are two of the features of the plant. Stairways, elevator shafts and toilets are located on the outside of the building. Abundant light and ventilation are furnished by the big windows extending the entire height and most of the length of the walls.

Group System of Power Transmission

The group system of power transmission is used—that is, the machines are divided into groups of four or more, each group having its own motor. Long drive shafts are thus eliminated and the possibility of accidents reduced. This system is used throughout the plant. Another idea which has worked toward increased production is employment of special men for special machines. Each man is given his own machine with a certain amount of work to do and is kept at that machine until he becomes expert in its handling. The working-foreman system is another feature. A foreman is in charge of each branch of work and is answerable only to the superintendent. This system has abolished the practice of shifting the blame and creates a closer relationship among the men.

Production of automobile gears and the smaller tractor gears begins in the turning department at the rear of the second floor, front section. The castings or blanks, drop forged or cut from bars, are brought by elevator from the receiving department directly below. Here a large battery of automatic, flat turret and screw machines, chosen especially for economic and rapid production, is constantly at work turning, boring, facing and performing other operations in the preparation of the blanks for the gear-cutting machines.

Immediately adjoining the screw-machine department is a large battery of lathes which takes care of work which makes turning on a lathe more feasible.

Adjoining the machine department and located midway between the ends of the building is the inspection department, into which the blanks pass after leaving the turning department and where they are inspected for accuracy. Each floor has its own inspection department, where the material is inspected after each operation.

On the side of the building opposite the inspection department is the toolroom and sub-stockroom. On past the inspection department, tool and stock rooms, in the front end of the building, is the spur cutting department. Here is a large assembly of Fellows automatic gear shapers and rotary cutters for producing gears and sprockets for the various types of transmission, starting and timing systems for automobiles, tractors, etc.

From the cutting department the gears are sent to the inspection department, which is located on the first floor. Here,

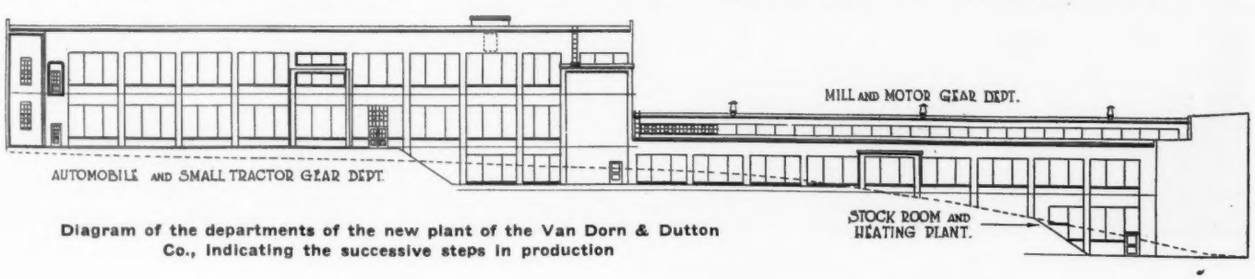
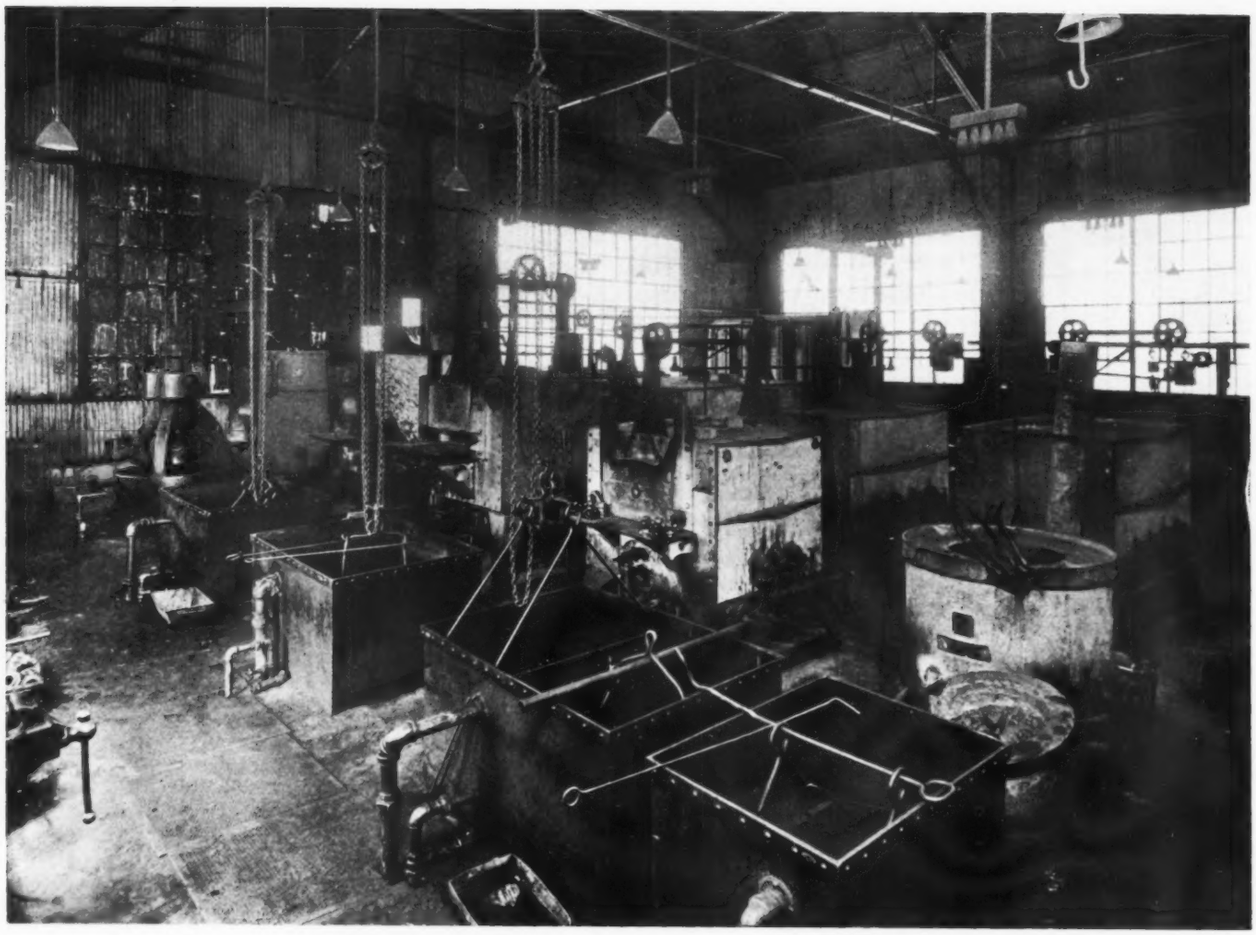
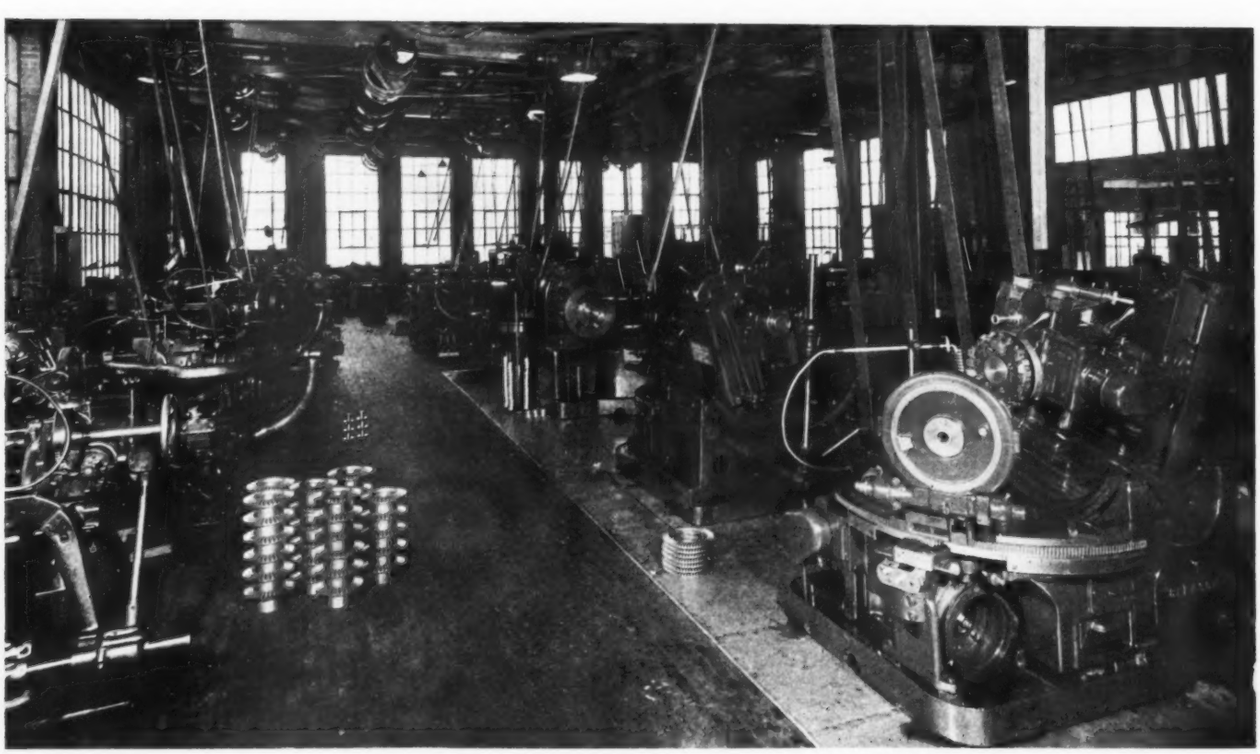


Diagram of the departments of the new plant of the Van Dorn & Dutton Co., indicating the successive steps in production



A corner of the hardening and steel treating department of the new plant of the Van Dorn & Dutton Co.



Part of the automobile gear department. The illustration shows the section devoted to the manufacture of spiral and bevel gears

in addition to the tests mentioned, the gears are subjected to an eccentricity test, the Brown & Sharpe machine being used. The gears are then taken to the hardening and heat-treating departments, a specially designed building being devoted entirely to this work. Here is located an extensive battery of large and small furnaces, with complete equipment for carbonizing and heating, so arranged that large, medium and small sized work can be handled to advantage. The temperatures of the furnaces are controlled by one man. Push buttons enable the temperature reader to notify the furnace man by means of colored lights.

The Sandblast Room

Leaving the heating plant, the gears are taken to the sandblast room, where scale, which the heat treatment may have produced on the steel, is removed.

In order that the gears may be accurate, that is, meeting the customer's demands, a whole department is devoted to their grinding and finishing. After this the gears are given a final scleroscopic or Brinnell test for hardness. Gears passing the final test are taken to the shipping room, where they are packed and loaded into cars.

The making of mill and motor gears and pinions, to which the rear section of the plant is devoted, embodies the same general operations as the production of automobile and tractor gears, although the work is carried out on a larger scale.

The entire north of the floor is devoted to the manufacture of mill and industrial gearing of the smaller type; that is, ranging in diameter from 6 in. to 2 or 3 ft. Here are long aisles of various types of gear cutting machines. A monorail system is used to transport the gears back and forth from the machines and to lift them into place. On the other side of the room where the larger gears are cut is a battery of large bevel gear shapers. Blanks weighing thousands of pounds are transported by a 5-ton Alliance crane and placed in positions on the machines. Gears or pinions to be hardened or heat treated are taken to the steel treating plant, being handled in a manner similar to that used in the treatment of automobile and tractor gearing. After being heat-treated they are returned to the main building to be sandblasted and tested before shipping.

Electric truck trailers and hand trucks are used in transporting the material from one department to another.

Each department has a man whose sole duty it is to remove the chips from the chip boxes on the machines. They are carried on trucks to hopper cars outside the building and delivered over an industrial railway to an oil-separating building. Here a battery of oil separators removes the oil from the chips and returns it to the oil system in the main factory. The chips are dumped into a chip bin, from which they are loaded by gravity into cars, to be hauled away.

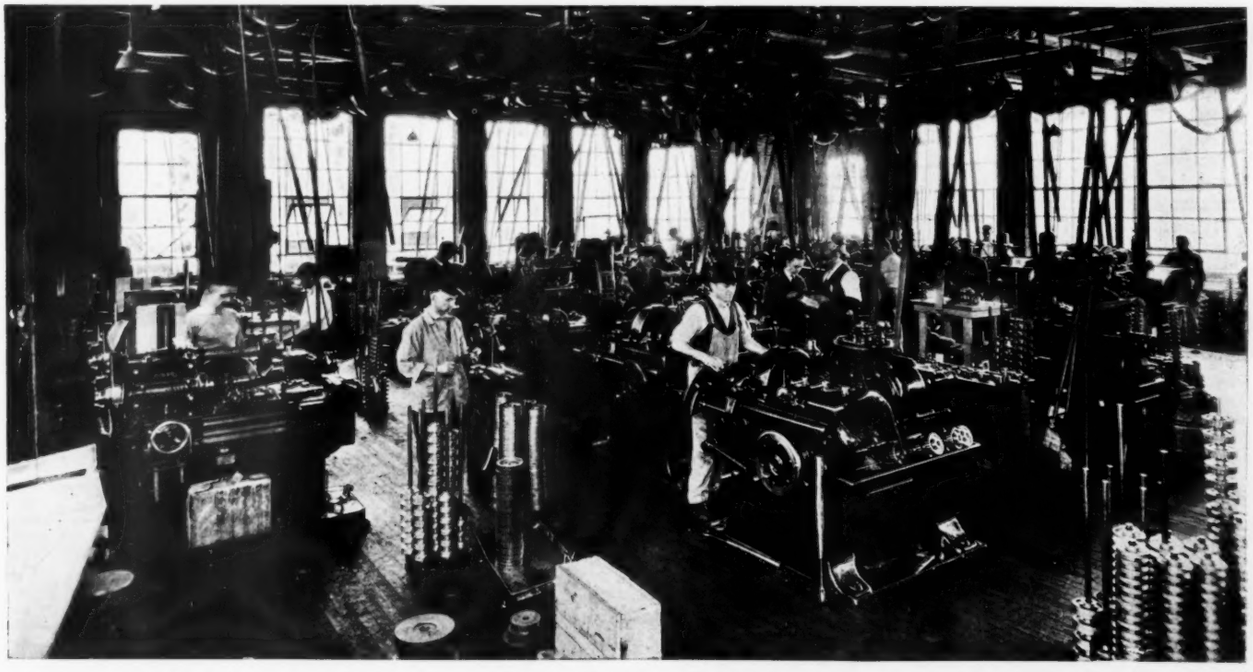
Ambulance Corps To Have 1500 Picked Men

THE United States Army Ambulance Corps will have 1500 picked men from universities throughout the country for service abroad. At the request of the Surgeon General's Department, and acting directly under experienced officers detailed for this work, the Intercollegiate Intelligence Bureau has assembled students for service in the Ambulance Corps. Among the colleges that have contributed one or more units to the Corps are Pennsylvania, Yale, Harvard, Princeton, Dartmouth, Williams, Johns Hopkins, Pittsburgh, Virginia, Iowa State College, University of Iowa, Hamlin, Lafayette, Purdue, Arizona, Indiana, Northwestern, Amherst, Tennessee, South Carolina, Florida, Washington and Lee, George Washington, Oberlin, Pennsylvania State, Leland Stanford, Illinois, Michigan, Swarthmore, Brown, California and University of the South. The students are now awaiting enlistment by officers to be detailed by the War Department.

This contingent, assembled for the United States Government to meet the need for medical service as requested by the French Commission, is to be utilized by the French Government until the arrival of the American troops, when it will be turned over to the military forces of the United States. The total number to be enrolled in this corps will be over 4000. All will be members of the Medical Enlisted Reserve Corps.

The corps is to be organized into units of 36 men each. These men will go into a training camp near Philadelphia for organization and they will sail just as soon as possible after their equipment is complete. More than half the quota will be college men of the type which has done such praiseworthy work with the American Ambulance Field Service. The other members will likewise be men especially picked for the work.

On receipt of the call for men from the Intercollegiate Intelligence Bureau, many institutions immediately formed special classes in Military Tactics, First Aid work, and in French. These men will have been especially trained for this particular service.



Spur gear division of the automobile gear department of the Van Dorn & Dutton Co. factory. Note method of handling gears on racks

Ten New Chalmers Bodies

Line Includes Closed and Open Cars—Chassis Practically Unchanged—Better Appearance and Greater Comfort

TEN new Chalmers models for the coming year will be mounted on practically the same chassis. Two wheelbases are used, 122 and 117 in., and there are some differences in gear ratio according to the size and weight of the body. A feature of the new bodies is the luxurious closed cars, which are finished in elaborate style.

The line includes a seven-passenger touring car, a five-passenger touring car and a standard roadster at $1,350; also a touring sedan, a three-passenger cabriolet, a seven-passenger town car, a landaulet, seven-passenger limousine, limousine-landaulet, and a four-passenger duplex model.

The limousine-landaulet, selling for $3,025, is finished in Chalmers meteor blue, with black fittings. The cushions are deep and covered with Laidlaw cloth. The woodwork is inlaid mahogany panel. All interior metal fittings are of the late Georgian-period design, the two dome lights are of frosted glass and switch on automatically when the doors are opened. A lady's vanity case is concealed in one side of the car and corresponding to this on the other side is a smoking set.

Driver Supplied with Telephone

The rear compartment is connected with the driver's seat by means of a car phone set flush with the interior panel, which is thrown into operation by pressure on a push button. The auxiliary seats are reversible in the limousine-landaulet, but this is not the case in the town car.

Two other features characterize the limousine-landaulet. One is that all the joints in the top are made watertight without the use of exterior irons. The other is that the leather in the folding rear quarter is specially prepared and bark-tanned, having the grain running horizontally across the back, so that the tendency to check is practically obviated.

A feature of the three-passenger cabriolet, selling for $1,725, is that the top is not of the folding type. The windows, however, can be removed, and because they extend practically to the rear of the permanent top, leave the car exceptionally open, so that the folding feature is not necessary.

With the exception of the top construction, the description of the limousine-landaulet applies to the seven-passenger limousine. The lines of the hood and front compartment blend into those of the inclosed rear compartment, and the entire car is expressive of quality and craftsmanship. The same applies to the town car, which of course does not have the roof over the driver's seat. The continuity of lines here is emphasized by the tilted windshield.

The windows are fitted with automatic regulators and silk curtains. In this model the auxiliary seats are not reversible and a foot hassock is used instead of a foot rail.

Sedan Has Many Attractive Features

The sedan should be an exceptionally popular model. With the windows in place it is a very attractive closed car, and with the windows removed it is practically an open car. The windshield is tilted, and the corresponding line at the rear is parallel to it. The effect given by the parallelogram inclosed between the straight top lines and the straight gunwale is pleasing. The windows may be completely dropped, together with the pillars, which are placed beneath the rear seat.

The same care in design has been applied to the open cars. The bodies are streamline throughout, with no break between the hood and the cowl, and with straight gunwales. An extreme tilt is given to the windshields that accentuates the streamline effect. Another feature on the open models is the design of the tops. The lower edge of the top when up is parallel to the top body edge and comes down quite close to it. It is, however, cut away slightly at the point of junction with the windshield.

The price of the seven- and five-passenger touring cars is the same, the former being mounted on a 122-in. chassis and the latter on a 117-in. wheelbase. The body lines are different, the back of the rear seat in the seven-passenger being provided with a cowl that molds into the body lines which is not used on the five-passenger.

In the four-passenger model, in spite of the low hung body and rakish appearance, the seats are not too low, extend full across the car, and are designed as much for comfort as for appearance. The steering post is tilted at an angle somewhat greater than that of the other models, as is the windshield. There is plenty of knee room in the front compartment, and the headlight and dimming switch are within easy reach of the driver on the instrument board. The body is somewhat narrower than that of the touring models.

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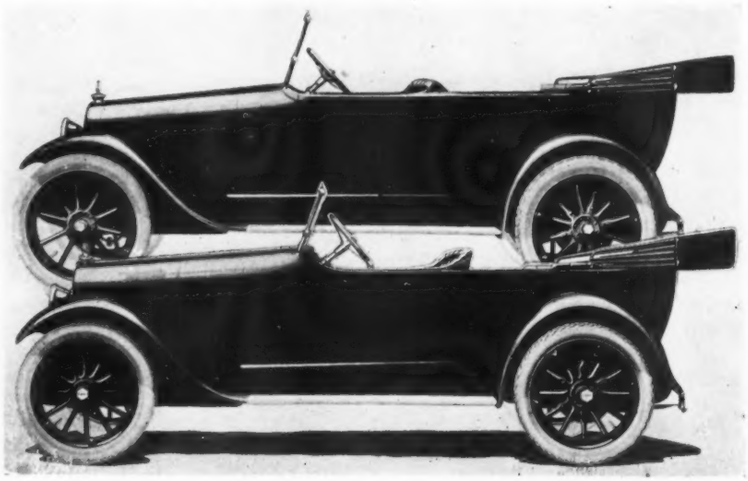
Making Air Bags Last

AN air bag's life can be greatly lengthened by observing the following rules: When the tire is placed in the mold, the clamp screw should be tightened until the exact size of the tire is obtained, and then given about one-half turn. This slightly decreases the size of the cavity and relieves the strain on the air bag, in addition to giving perfect results in the cure.

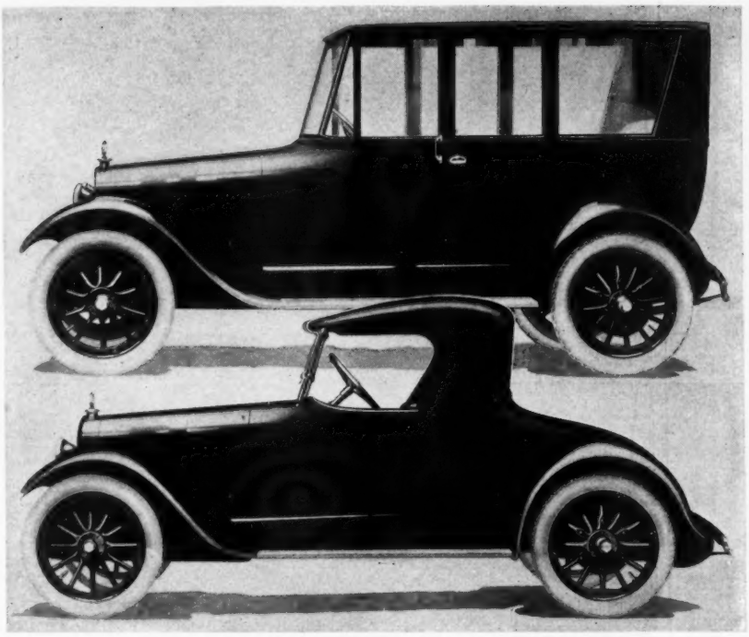
Never allow the bag to become flat, as this will cause cracks in the lining. Inject a little water into the bag each week in order to keep the inside of the bag moist. Don't pull the bag out by the tube; use the tape. By observing these precautions air bags have been used for as many as 145 cures.—D. R. Cain, Instructor, School of Tire Repairing, Goodyear Tire & Rubber Co.



Upper—Chalmers seven-passenger touring car on 122-in. chassis. It sells for $1,350. Lower—Four-passenger duplex on 117-in. chassis, listing at $1,475

Specifications of New Chalmers Bodies

Model	Wheelbase, In.	Price
Touring car, seven-passenger	122	$1,350
Touring car, five-passenger	117	1,350
Standard roadster	117	1,350
Touring sedan	122	1,850
Cabriolet, three-passenger	117	1,725
Town car, seven-passenger	122	2,925
Landaulet	122	3,025
Limousine, seven-passenger	122	2,925
Limousine-Landaulet	122	3,025
Duplex, four-passenger	177	1,475
Color	Meteor blue	
Wheelbase	117 in. on five-passenger touring car and roadster, 122 in. on all other models	
Engine	Six-cylinder, 3¼ x 4½ in.	
S. A. E. rating	25.4 hp.	
Cylinders	L-head, cast in block	
Carbureter	Stromberg	
Ignition	Remy distributer and high-tension coil	
Battery	Willard 80-amp.-hr	
Starting and lighting	Westinghouse two-unit system	
Fuel feed	Stewart-Warner	
Lubrication	Force and splash	



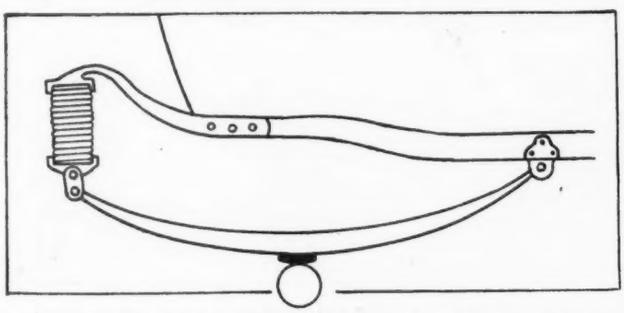
Above is the new Chalmers touring sedan which is mounted on the 122-in. chassis and sells for $1,850. Below is the roadster, built on the 117-in. chassis and selling for $1,350

Coil Spring to Neutralize Hollows

Prevents Movement of Leaf Spring in Passing Over Holes in Road—Is Normally Inoperative

AN idea which is believed to be entirely new in automobile springing is the invention of C. H. Crockett, Troy, N. Y. It consists of a coil spring *in compression* which replaces the usual rear shackle on the rear spring of the chassis. Under normal load this spring is completely compressed and in meeting an obstacle the leaf spring deflects just as though the attachment was not there. On encountering a small hole in the road, however, the action is as follows:

As the wheel passes the edge of the hole the weight tends to force the axle down, letting the wheel drop into the hole. With the usual leaf spring the inherent friction resists this drop, so that the tire will actually leave the road for an instant; the spring then expands, and when expanded is not able to support the full weight of the car body and load, so that it has to be compressed again as the wheel rises out of the hole. The tendency is for the body to continue to move in a straight line, without dropping, owing to its momentum, and Crockett argues that the expansion and re-compression of the leaf spring impresses forces on the body which produce shocks or oscillations.



Diagrammatic form of Crockett suspension, showing coil spring fully compressed in the normal position

With the coil spring, normally in full compression, directly the wheel reaches a hole and the support is momentarily removed the coil expands practically without any lag, forcing the axle away from the body of the car via the leaf spring. On the return the coil compresses again and, if the hole is small, the axle can be pushed down and allowed to return again so rapidly that the leaf spring has not had time to deflect sensibly. Thus, the theory is, no work has been done by the leaf spring in expanding and none has to be done on it afterward to return it to normal deflection. The supporting power of the coil spring is not lessened very greatly by a small extension in length, so the load on the leaf spring is not altered from the time of striking the hole to the time of leaving it.

Compression Cared For by Leaf Spring

On striking an obstacle the compression is all cared for by the leaf spring, but the extension immediately after passing the obstruction is performed first by the coil spring, the load on the leaf spring end being thus maintained, which is claimed to eliminate the need for rebound checks.

A representative of THE AUTOMOBILE recently tested an experimental system attached to a Ford car and a short run over very rough stone block paving disclosed no bounce, while all sharp shocks came without question from the front wheels. Mr. Crockett stated that he had considerable experience of air springs and that his idea was the outcome thereof. The attachment has the advantages of cheapness and simplicity.

Thawing Repair Gum in the Winter Time

REPAIR gums and fabrics received in cold weather sometimes appear lifeless, when as a matter of fact they are merely frozen. The freezing does no harm, but it is a good plan to thaw out the repair stocks in a warm room before using.—D. R. CAIN, Instructor, School of Tire Repairing, Goodyear Tire & Rubber Co.

Row of vats for Lohmannizing process. In the immediate foreground is the caustic bath, next to it the acid vat with hood for carrying off fumes. At the extreme rear is the container for the final molten metal solution

Lohmann Rust-Proof Process

Emil Grossman Mfg. Corp. Equips Special Plant to Utilize It on Extensive Scale

LOHMANNIZING is the name of the process extensively used by the Emil Grossman Mfg. Corp., Brooklyn, N. Y., to give a rust-proof finish to steel bumper bars, nuts and bolts and other accessory parts. The process, which derives its name from the inventor, Lohmann, involves passing the unfinished metal through several solutions, ending with a bath of molten alloy.

The Lohmannizing plant is in factory No. 95 of the Bush Terminal at some distance from the main plant of the Grossman company. The chief equipment of the factory comprises five large tanks and a grinding room. The unfinished metal parts are first dipped in a tank of diluted caustic solution to remove dirt and other impurities. They are then given an acid bath in a weak solution of hydrochloric and sulphuric acid which will neutralize the caustic and remove any dirt that remains. The contents of both these tanks are kept warm by a small heating unit. There is a hood over the pickle tank to carry off the acid fumes.

The next step is to wash the bars off with water. After this they are put in a tank filled with the patented Lohmannizing solution which fills the pores of the steel or iron and gives it a surface which will receive the Lohmann metal. After passing through this solution the bumpers are placed in the final tank which contains a molten mixture of lead, tin and

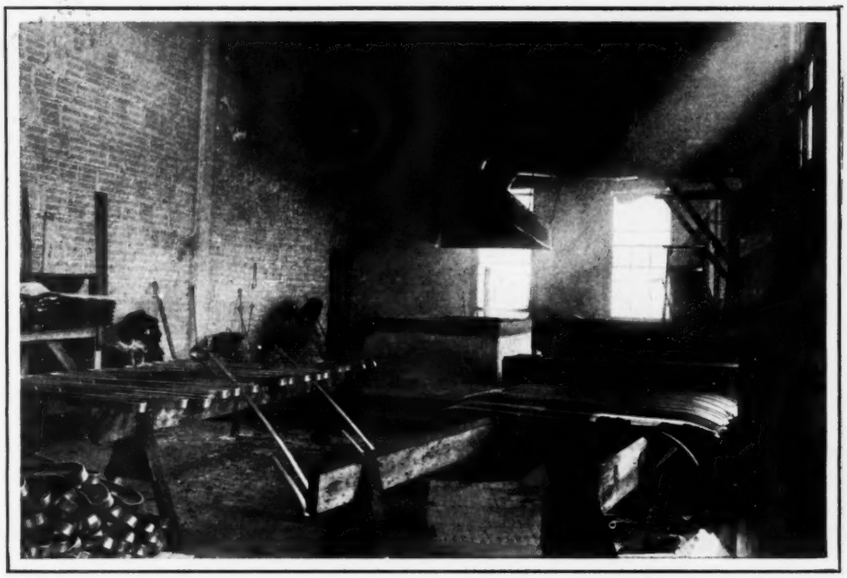
Grinding room of the Lohmannizing department of the Grossman plant, where parts which have been treated are smoothed off ready to be plated and buffed. A 50-hp. motor drives thirty-eight emery wheels in this room

antimony kept by a furnace at a heat of 640 deg. There is a large hood over this metal tank, as shown in the illustration, to carry off the hot vapor arising from it.

As the parts treated are lighter than the molten Lohmann alloy, they float and are withdrawn from the tank by means of hooked rods and laid on racks. Men with gloved hands wipe the bars off with waste. The metal which is wiped off falls to the floor and is later swept up and remelted.

Rough parts are then taken to the grinding room, where they are polished on emery wheels. A double-head blower equipment driven by a 25-hp. electric motor conveys the emery dust, filings and vapor to a separator. The vapor passes off, and the emery dust and filings are separated ready to be sold.

The grinding department uses thirty-eight emery wheels, which are driven by a 50-hp. electric motor. The addition of this department and the first stages of the Lohmannizing plant to the Grossman equipment have meant an expansion of the working force by about sixty men. The present capacity of the plant is about 1000 bumper bars daily in addition to mirrors, nuts and other parts which are being rust-proofed. Space has been reserved for additional equipment in all departments.



Racks for drying bumper bars after they have been Lohmannized. At the rear is seen the furnace of molten metal in which the bars have been dipped

There are several interesting details in the factory arrangement. The reserve stock is kept on the second floor. It is loaded onto this floor from motor trucks by an electric crane. The trucks bring all rough stock needing grinding or Lohmannizing to No. 95 direct from the freight yards, rather than from the main Grossman plant. No. 95 has two heating units, one for use in winter to warm the building and the other for keeping the caustic and pickle tanks warm.

The bars for bumpers are received at the plant and reshipped in flat crates measuring 28 by 64 in. These crates are made to nest compactly and are divided into four compartments. Each compartment will hold one of the double bumper bars, or three of the single bars.

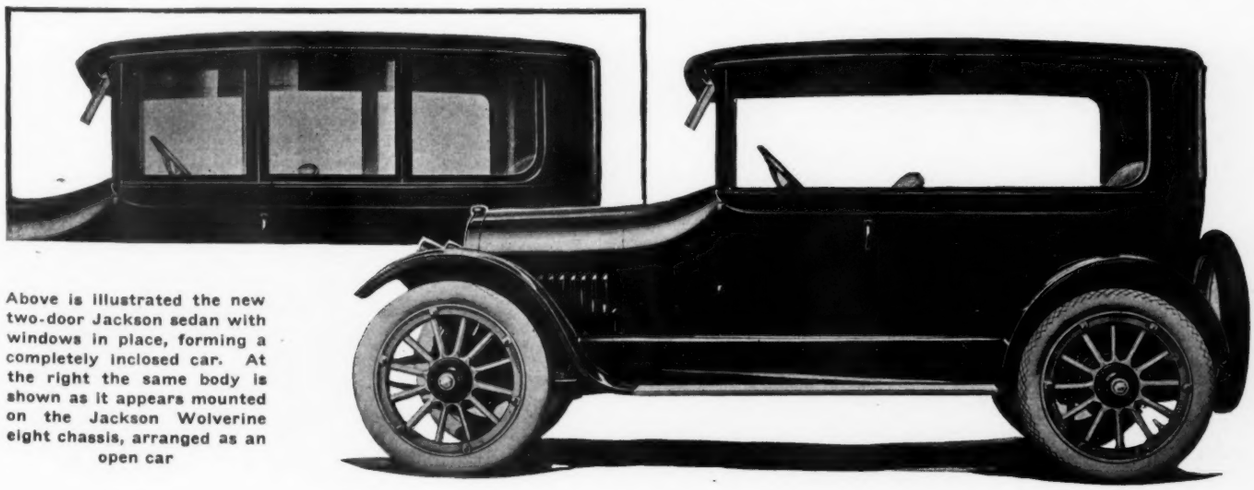
The stockroom affords 4000 sq. ft. of storage space. The facilities for manufacturing here are favorable because of the up-to-date construction of the Bush Terminal. No. 95, however, was partially reconstructed for the present process. The chief improvement was the addition of sixteen windows to provide maximum light and ventilation.

After the parts have been Lohmannized they are sent to the main plant, where they are plated, buffed and assembled ready for the market.

Jackson Sedan on Wolverine Eight Chassis

A NEW sedan has been brought out by the Jackson Automobile Co., Jackson, Mich., and mounted on the chassis of the Wolverine eight. This is a two-door, divided seat job. The rear seat accommodates three, and there are auxiliary chairs for two additional passengers. A feature of the rear seat arrangement is the form-fitting back and the arm rests which have been provided for the passengers. There is a wide aisle between the front seats and liberal knee room between the rear seat and the auxiliary chairs. These bodies are built in the shops of the Jackson company under license from the Springfield Metal Body Co., owner of the patents.

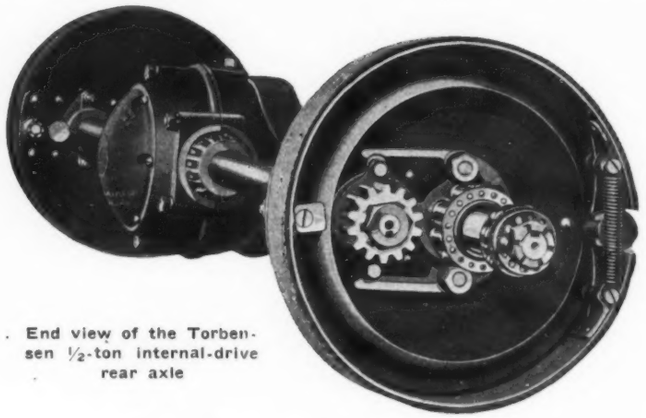
The interior finish is in gray coach cloth, or in long-grained leather, as desired. The upholstery is the French piping, with no tufts or buttons. The car will sell for $2,095.



Above is illustrated the new two-door Jackson sedan with windows in place, forming a completely inclosed car. At the right the same body is shown as it appears mounted on the Jackson Wolverine eight chassis, arranged as an open car

Torbensen Internal Gear Axles

Now Made for 1 1-2-, 1- and 2-Ton Trucks—Differential Mounting a Feature



End view of the Torbensen ½-ton internal-drive rear axle

TORBENSEN internal gear axles, made by the Torbensen Axle Co., Cleveland, are now being made in three capacities—for ½-ton, ¾-ton, 1-ton and 2-ton trucks. Two of the types are substantially the same in design except that the 2-ton, or Type C, is larger in every member, being capable of carrying a 2-ton load with a substantial overload. The rating given for capacity is 6500 lb. total for truck and load on the rear axle.

The smaller axle is known as Model A and is an improvement over Model R-1, of which several thousand are now in service. The principle involved in this drive is to supply one solid member for carrying the load on a separate member for transmitting the power to the wheel. The carrying member is a drop-forged steel I-beam carrying the wheels on roller bearings. The jackshaft or power transmitting unit is anchored on this forging and only carries the propulsion stresses. All of the driving mechanism is enclosed, affording protection against dust and holding the lubricant.

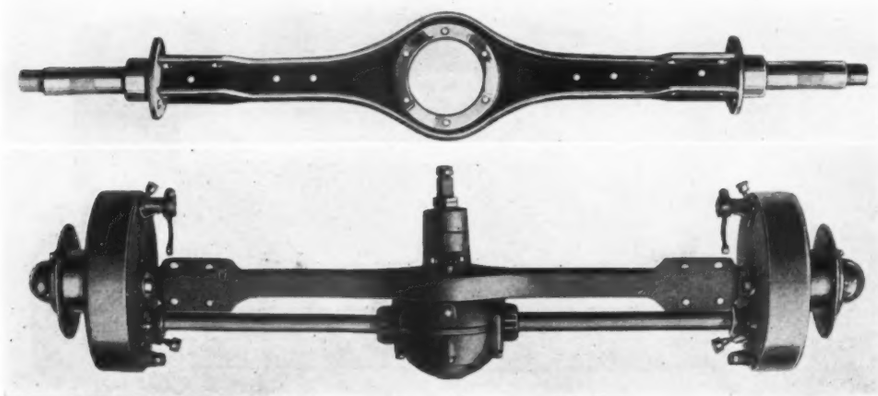
Differential Mounting a Feature

One of the interesting points in this type of drive is the method of mounting the differential, which is carried in the expanded part of the I-beam center web. The jackshaft is connected flexibly with this forging by having the ends of the jackshaft tubes loosely fitted in the differential housing. This furnishes flexible joints at this part of the truck structure, and thus is intended to guard against destructive action on the bearings and differential units, due to any flexure of the I-beam under load. The I-beam forging is quite similar to the forging used for the front axle except that it has the expanded center to carry the differential. The only function that is performed by this part of the axle is to carry the load. The forging is a one-piece job made from a .40 carbon steel billet which, after being forged, is given a double heat treatment to increase its toughness.

The drop forged load-carrying member of I-beam cross-section is used because it is the strongest and lightest

SUMMARY OF TORBENSEN AXLE DETAILS

	Type A	Type C	Type O
Capacity	3800 lb. truck and load on rear axle; 22 hp., A. L. A. M. rating.	7000 lb. truck and load on rear axle; 26 hp.	2700 lb. truck and load on rear axle; 17 hp.
Track	56 in. center to center of spokes.	56 in. center to center of spokes.	56 in. center to center of spokes
Spring center	39½ in. max.—37½ in. min. with 2½ in. springs.	39 in. max.—37½ in. min. center to center of springs	40½ in. max.—37½ in. min.
Width of springs	2¼ in. or 2½ in.	2½ in. to 3 in.	2 in.
I-beam	Drop forging 3 in. x 2 in.	Drop forging 3½ in. x 2¼ in.	2¾ in. x 1¾ in.
Spindles	Chrome vanadium, double heat-treated.	Chrome vanadium, double heat-treated	Chrome vanadium, double heat-treated
Brake drum	Pressed steel, 15 in. dia.	18 in. dia.	14 in. dia.
Brakes: Ext.	15 in. x 2½ in. (Raybestos lined).	18 in. x 2½ in.	14 in. x 2 in.
Int.	14½ in. x 2¼ in.	17½ in. x 2¼ in.	13½ in. x 2 in.
Hubs	Malleable iron for 14 spokes.	14 spokes	125 spokes
Hub flange	Malleable iron, 9⅝ in. dia.	Malleable iron, 10¾ in. dia.	8⅞ in. dia. pressed steel
Jackshaft	Chrome nickel, double heat-treated.	Chrome nickel, heat-treated	Chrome nickel, heat-treated
Bevel gears	3½% nickel steel.	3½% nickel steel	Carbon steel
Internal gear:			
Gear ring	.50 carbon steel, 52 teeth, 1⅛ in. wide, 5½-7 pitch, tempered.	54 teeth, 1⅝ in. wide, 4½-5 pitch	48 teeth, 5½-7 pitch, 15/16 in. wide
Pinion	Chrome vanadium, 13 teeth, 1¼ in. wide, 5½-7 pitch.	12 teeth, 1 11/16 in. wide, 4½-5 pitch	14 teeth, 15/16 in. wide, 5½-7 pitch
Differential	Brown-Lipe-Chapin.	M. & S.	Brown-Lipe-Chapin
Propeller shaft	Square or taper end. S. A. E.	Square or taper, S. A. E.	Square or taper, S. A. E.
Bearings:	Bower and Bock.		Bower and Bock
Inner hub	309-N Bower	311-N roller Bower	308-N Bower
Outer hub	306-N Bower	311-N roller Bower	306-AL Bower
Jackshaft	306-N Bower	1407 ball	306-AL Bower
Differential, left	355 Bock	3750 taper roller, Bock	336 Bock
Differential, right	355 Bock	375 taper roller, Bock	276 Bock
Pinion shaft, rear	417 Bock	417 taper roller, Bock	335 Bock
Pinion shaft, front	335 Bock	335 taper roller, Bock	275 Bock
Weight	365 lb.	With hubs, 560 lb.	235 lb.
Gear ratios	7 to 1 and 8 to 1 Special, 10 to 1	10.3 to 1, 9 to 1, and 8 to 1 Special	Standard 5⅓-1 and 6½-1 Special, 8 to 1



Above—I-beam forging, showing expanding center for differential of the Torbensen 2-ton internal-drive axle. Below—Top view of the Torbensen ½-ton internal-drive rear axle

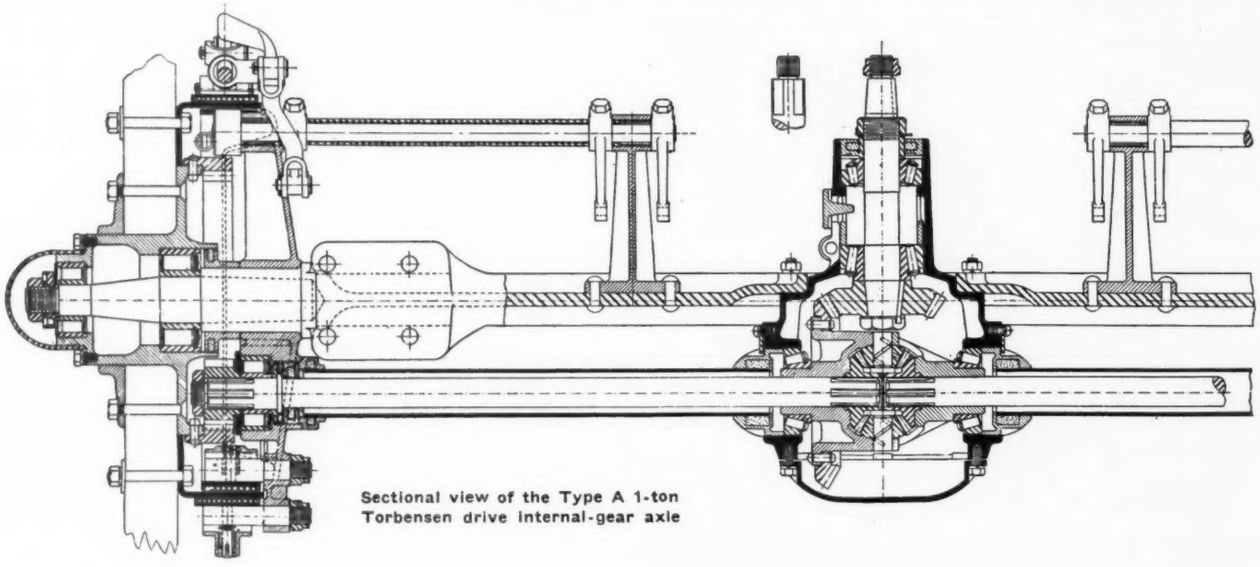
design possible. The forging is finished all over, and not finished one-half at each time as front axles are usually finished. This avoids lack of uniformity in dimensions and heat treatment which is found in front axle I-beam forgings. The spindles are made of chrome vanadium, and because of their size and shape it is very much better practice to make them from the bar and insert them in the I-beam forging. It is thus possible to get those qualities most to be desired in spindles without sacrificing the qualities required for the drop forging, and each is given the individual heat treatment that will enable it to carry its load and perform is functions in the most satisfactory manner. This would not be possible in a forging with spindles integral.

As will be noted from the illustrations, the drive is through an internal ring gear which is a drop forging of .50 carbon steel. After being machined all over, this gear is oil-tempered to a hardness of about 70 sclerescope. In assembly it is pressed over a malleable hub, to which it is secured by twelve rivets.

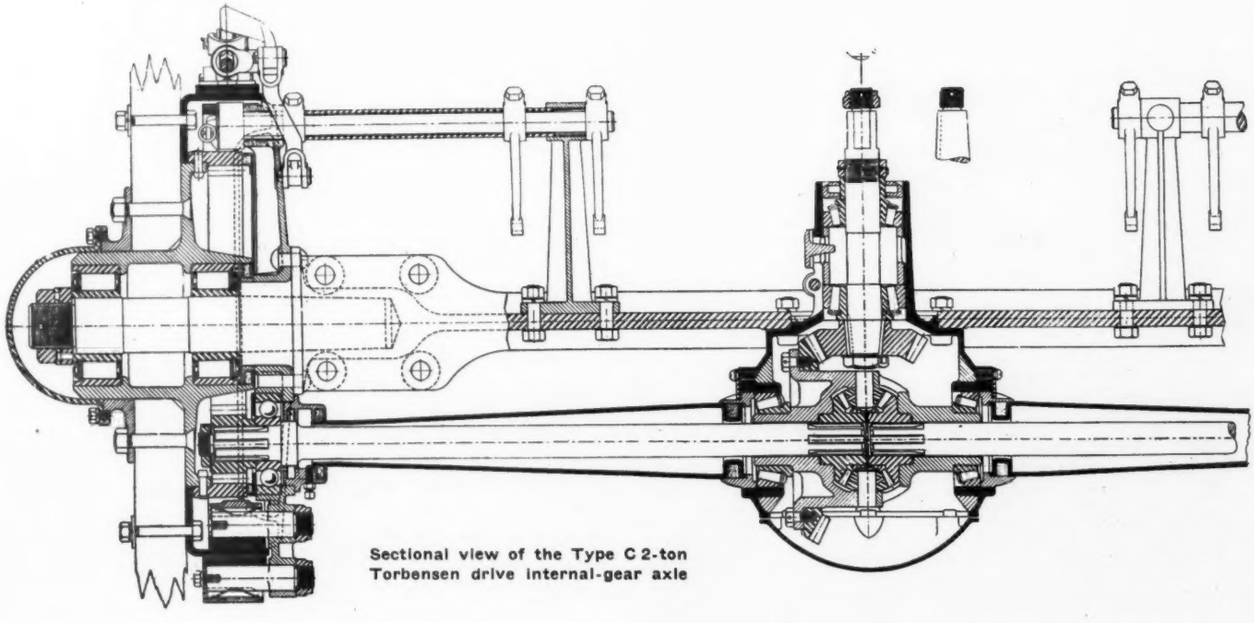
A feature of the axle is the accessibility of the differential secured by dividing the carrier along the center line of the jackshaft. By this means both the pinion and differential bevel gear can be adjusted readily in either direction. One of the improvements in this axle over its predecessor is that the bevel gears are nearly twice the size of those in the former model, giving greater strength on account of reduced unit tooth pressure. The bearings are Bock for the differential and drive shaft and Bower in the hubs and ends of the jackshaft.

The larger axle is known as Model C, and the materials and construction are the same as in Type A, with the exception of larger dimensions in order to take care of the higher stresses and greater loads. On both these models the brakes are external contracting for service and internal expanding for the hand brake. To guard against oil collecting on the brakes, a curved shield extends over the edge of the internal gear. Against the edge of the internal gear there is an annular felt ring which excludes dust and moisture from without and holds the lubricant within. Any surplus grease that escapes the felt packing is drained off through an opening in the shield, thus keeping the brakes dry and free from grease.

The third size, known as Model O, of ½-ton and ¾-ton carrying capacities, has recently been added, and the specifications of this are shown in the accompanying table. This type O axle shows the line of construction of the standard Torbensen design, but in this model pressed steel has been used to a considerable extent in order to make a light and strong job which would allow it to be used for light delivery wagons. At the same time the axle is strong enough for heavy work on solid tires up to ¾-ton capacity.



Sectional view of the Type A 1-ton Torbensen drive internal-gear axle



Sectional view of the Type C 2-ton Torbensen drive internal-gear axle

Automobile Calendar

ASSOCIATIONS AND CLUBS

Sept. 12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, Mid - Season Meeting.
Sept. 25-28—Pittsburgh, National Assn. of Purchasing Agents, Convention.

CONTESTS

1917

June 16—Chicago, Ill., Speedway Race.
June 23 — Cincinnati, Ohio, Speedway Race.
July 4—Omaha, Neb., Speedway Race, Championship.
July 4—Uniontown, Pa., Speedway Race.
July 4—Tacoma, Wash., Speedway Race.
July 4—Visalia, Cal., Road Race.
July 4—Spokane, Wash., Track Race.
July 4—Benton Harbor, Mich., Track Race.
July 14—Rochester, N. Y., Hillclimb.
July 15—Missoula, Mont., Track Race.
July 17-19—Buffalo, N. Y., Intercity Reliability.
July 22—Anaconda, Mont., Track Race.
July 29— Great Falls, Mont., Track Race.
Aug. 5—Billings, Mont., Track Race.
Aug. 17 — Flemington, N. J., Track Race.
Sept. 3—Uniontown, Pa., Speedway Race.
Sept. 3—Cincinnati, O., Speedway Race, Championship.
Sept. 6—Red Bank, N. J., Track Race.
Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.
Sept. 15 — Providence, R. I., Speedway Race, Championship.
Sept. 22—Allentown, Pa., Track Race.
Sept. 28—Trenton, N. J., Track Race.
Sept. 29—New York Speedway Race, Championship.
Oct. 6—Danbury, Conn., Track Race.
Oct. 6—Uniontown, Pa., Speedway Race.
Oct. 13—Richmond, Va., Track Race.
Oct. 13 — Chicago Speedway Race, Championship.
Oct. 27 — New York Speedway Race.

SHOWS

June 9-16 — Detroit Used Car Show, Crosstown Garage, Detroit Auto Dealers' Assn.
June 20-27 — Montreal, Que., Used Car Show, Coliseum, Montreal Automobile Trade Assn.
Aug. 6-10—Fremont, Neb., General Tractor Demonstration.
Sept. 2-9—Spokane, Wash., Interstate Fair.
Sept. 9-15 — Milwaukee Show, State Park Fair, West Allis.
Sept. 9-15 — Milwaukee, Wis., Fall Show, Wisconsin State Fair, West Allis, Milwaukee Automobile Dealers.
Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers Assn. State Fair.

S. A. E. Calendar

Midsummer Meeting

June 25-26—Washington, D. C.
June 26—Informal dinner, New Willard Hotel.

Standard Division Meetings

JUNE

19—Lighting, Detroit.
20—Aeronautic, Washington.
20—Data Sheet, New York.
25—Standards Committee, Washington.

Section Meetings

JUNE

15—Cleveland, Paper by E. H. Sherbondy of the Peerless Motor Car Co. entitled "Aviation Engines, with Particular Reference to the Benz and Mercedes Types."
15—Indianapolis, Claypool Hotel. Aeroplanes, by Dr. Tobias Dantzig.

Engineering Calendar

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.
Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architects and Marine Engineers.

JUNE

15—Illum. Eng. Soc. Pittsburgh section, Office Building, Lighting and Inspection Trip through City and County Building. Mr. S. G. Hibben.
16—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
18-19-20 — Master Car Bldrs. Assn. convention, Greek Temple, Atlantic City, N. J. Hdqrs. Marlborough-Blenheim Hotel.
20-22—Amer. Inst. Chem. Engrs., Ninth Semi-Annual Meeting at Buffalo.
21—Mining & Met. Soc. of Amer. New York section monthly meeting at Engrs. Club.
26-30—Amer. Soc. for Test. Mat. annual meeting Atlantic City, Hotel Traymore, Business meetings, reception and golf tournament.

JULY

7—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn section at Phila.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
14—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
16—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

AUGUST

4—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

SEPTEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburg section.
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.
24—Amer. Inst. Metals at Boston.
24—Amer. Fdry. Assn. annual meeting at Boston.

OCTOBER

6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
17-18-19 — Amer. Gas, Inst. at Washington, D. C.
18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.
20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

NOVEMBER

3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.
15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.
17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

DECEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.